

ARCHIVES OF OTOLOGY.

NATURE AND AIM OF OBJECTIVE MEASUREMENT OF HEARING, AND ON THE USE OF THE OBJECTIVE AUDIOMETER.

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OSTMANN'S method of testing the vibratory amplitudes of tuning-forks is to fasten them into a vise which is imbedded in a stone wall. The microscope with which the vibrations are measured is placed on an iron plate, likewise imbedded in the wall. Dry flour is strewn on the end of one of the prongs, and one of the granules nearest the edge is observed with the microscope, the excursions being measured with the micrometer eye-piece. A sort of gag, in which the initial force is always the same, sets the forks in motion. Three persons are needed for the tests: one to watch the vibrations, a second to call off the time, and a third to note the micrometer values when called off.

After a critique by Dr. H. Knapp,¹ the author wrote as follows:

"The friendly reception and criticism given to my brochure, *An Objective Audiometer and its Use* (J. F. Bergmann, 1903), give me the chance to describe more fully the nature and aim of the objective measurement of hearing, as well as those of an objective audiometer which I have experimentally discovered.

"It is of the greatest importance in otology to be able to measure the extent and form of any disturbance of hearing objectively, because analysis of hearing is one of the

¹ These ARCHIVES, vol. xxii., p. 412.

most suggestive, and occasionally the only support for differential diagnosis between diseases of the sound-conducting and sound-perceiving apparatus."

Next to v. Conta,¹ Politzer² and Lucae³ deserve the credit of having first recognized the differential and diagnostic importance of examinations of the ear with simple pure tones. The methodical use of forks of varying pitch developed at once the extreme diagnostic value of such investigations. For, as Lucae said: "The important discovery was made that a series of affections which, from the objective conditions and the usual terminology, would have been registered as chronic middle-ear or tympanic catarrh were proved to be well defined diseases of the inner ear."

Having then no audiometer objectively correct, all measurements of the hearing were made after v. Conta's principle. They compared the time during which a dying-out fork was perceived by the patient and by the normal ear, and expressed the acuteness of hearing by a fraction; the numerator marking the seconds during which the sound was perceived by the deaf ear, and the denominator those for which it was perceived by the normal ear.

To this method Hartmann⁴ added his graphic representation of hearing tests, against which Jacobson at once protested⁵ and as I think justifiably. As, however, we knew of no better substitute, we had to satisfy ourselves in obtaining, even if by a false analysis, pictures which could to a certain extent be compared with one another.

It became more evident in the course of time, that an objective measurement of hearing, with unclamped tuning-forks, could only be established on the normal dying-out curves, and when Bezold and Edelmann had at last produced their continuous tone-series, the necessary material was ready and more earnest efforts began.

¹ "A New Audiometer," *A. f. O.*, vol. i., p. 107, 1864.

² *Wien. klin. Wochenschr.*, Nos. 42 to 44, 1868, and *Wien. med. Presse*, Nos. 12 and 13, 1869.

³ *A. f. O.*, Bd. No. 120, 1879, vol. xv., p. 277, 1880, and vol. xix., p. 73, 1883.

⁴ *Deutsch. med. Wochenschr.*, No. 15, 1885.

⁵ *A. f. O.*, vol. xxiv., 1887.

The first experiments to determine such values were made by Edelmann¹ but did not meet with the desired success. The determination of the acuteness of the hearing, based on these experiments, as was proposed by Bezold,² is erroneous, as has been proved by Schmiegelow and Forchhammer, Wien at the telephone, Zwaardemaker, Jacobson and Cowl, and myself. Panse also made unsuccessful experiments in this direction.

Therefore, up to the appearance of my paper, no one had determined the curves of Edelmann's unclamped C and G forks from the greatest amplitudes to the normal threshold-value, so that the amplitudes could be directly measured at intervals of seconds, or could be accurately calculated from the separately measured values. The reason for this lay in the extreme difficulty of measuring the minute vibrations with the necessary accuracy.

Gradenigo described at the Sixth Otological Congress in London³ an optical method of measuring the hearing, which can only be used to a limited degree. For, as he says: "The best results were obtained with forks of 60 V a second, although it can be used for those of 250 V." But as Politzer replied⁴: "In the case of forks over 60 V per second, which are heard longer than the vibrations of the triangle are visible, we are obliged to use the watch to determine the duration of the perception, assuming as the zero point the point at which the optical double images disappear."⁵

Forks of the second, third, and fourth octave are as necessary for measuring the hearing as the deeper forks; yet with such forks Gradenigo's method leaves us in the lurch. The amplitudes of higher forks soon become so minute that direct reading is almost impossible, although under special precautions, and when utilizing the higher magnifying powers, this may be done.

¹ *Trans. German Otological Cong.*, 1897.

² *Z. f. O.*, Band 33, 1898, p. 174.

³ *Transactions*, p. 17.

⁴ *Lehrbuch*, 1901.—ED.

⁵ The triangle is painted on one arm of a fork, and when the fork vibrates the figure looks blurred. See these ARCHIVES, vol. xxvii., p. 410.—TRANSLATOR.

Struyken¹ developed Gradenigo's method by first micro-photographically producing the triangle so that amplitudes of from 200μ to 2μ could be observed, and finally perfected this plan till he could read amplitudes up to $1m$ from the forks without a microscope.

Zwaardemaker and Quix also used this method, and we can now say that, by their latest modifications and mine, with proper magnifying powers, we have measured, down to the lowest limits, the amplitudes of forks. Even then, however, we are hindered by imperfection of our apparatus, so that we have not yet obtained a sufficiently broad foundation for a perfect objective audiometer. Personally I have measured an amplitude of $0.0009mm$. Beyond this it was impossible to go. Therefore, with a c' fork, measurement of the amplitudes ceases one minute earlier than the vibrations of the fork become inaudible to the human ear.

We therefore see that the problem offered was not to be solved by direct measurements of the amplitudes alone, and, considering the infinite minuteness of the amplitudes of the higher forks, it could not be solved at all. It could only be perfectly solved by discovering the laws by which the normal amplitudes diminish in extent from octave to octave, as well as by determining the fact that the normal dying-out curves represent exponential curves; then the curves could be determined mathematically. The details of these laws can be seen in my brochure on "Vibrating Numbers and Threshold Values."²

Let me now explain the aim of objective measurements. This should determine both the amount and the form of the disturbance of hearing. The best means to find the amount, so far as the perception of speech is concerned, is by the whispered voice, but this cannot give us any idea of the form of the defect, as I have shown long ago.³ Furthermore, it can only be utilized within

¹ *Arch. Internat. de Laryng.*, Jan. et Fev., 1902.

² *Engelmann's Arch f. Physiologie*, 1903.

³ *Naturforsch. Versam. Cassel*, 1903, and *Wien. med. Woch.*, Nos. 19 and 20, 1903.

extremely narrow limits in diagnosing the seat of the disease.

It is evident that the objective measurement of hearing with various high tones in no way diminishes the practical importance of testing the hearing with the voice, or makes any pretence to take its place.

The chief aim then of an objective determination of hearing is a more accurate diagnosis. This aim is also very practical, and has been energetically pursued for years by v. Conta, Politzer, and Lucae, to mention no others.

Another purpose of objective measurements with simple high forks is to obtain a more solid auditory and physiological foundation for tests with the voice, and, by comparison of the objectively-correct functional tests with pathological findings, to develop the physiology and pathology of the ear. Even the incorrect method of measuring with forks of various pitch has brought out many points of practical value in a differential-diagnostic point of view. Ought we not then to expect still greater success from correct measurements?

Gradenigo's method has not furnished the foundation for objective measurements; it is still an experiment, and, in the limits suggested above, a successful experiment to measure the vibrations of the lower forks. From this experiment, however, to the completion of tables for testing the hearing between the limits of the C and c⁴ forks is a long step.

My method is exact and reliable if the precautions are observed. With it I succeeded, with unclamped C and G Edelmann forks from the great to the fourth octave, in determining the dying-out curve to the cessation of sound for the normal ear, *i. e.*, to the normal threshold-value, so that for the entire duration the amplitudes, so far as they were not measured with the microscope, could be calculated in intervals of seconds. This was accomplished by interpolation of the values lying between the measured altitudes, and by extrapolation of those parts of the curves of the higher forks whose amplitudes, owing to their minuteness of excursion, could not be measured at all.

By mathematical calculations, we now found these normal amplitudes to be

for C

	<i>mm</i>
Of the great octave.....	0.0711
“ “ small octave.....	0.00474
“ “ first scored octave.....	0.000316
“ “ second scored octave.....	0.0000211
“ “ third scored octave.....	0.00000141
“ “ fourth scored octave.....	0.000000094

for G

Of the great octave.....	0.0118
“ “ small octave.....	0.00079
“ “ first scored octave	0.000053
“ “ second scored octave.....	0.00000353
“ “ third scored octave.....	0.0000002353
“ “ fourth scored octave	0.0000000157

As previously mentioned, the normal amplitudes of the highest forks can be calculated from those of the lower forks and from the number of vibrations.

Having once determined the normal curves of the unclamped C and G forks from a moment of extreme vibration to their dying out for the normal ear, tables could easily be constructed so as to be of practical use. These show the duration of vibrations in intervals of seconds, the time of dying out, the extent of the amplitude, the amount by which the amplitude diminishes, second by second, and so far as the extent of the amplitudes equals the number of normal amplitudes contained in each preceding larger amplitude of the dying-out curves. With these at hand, an objective test is easily, rapidly, and exactly carried out, presupposing that the forks have the same curves as those used in our tests, viz., the latest Edelmann model.

Every one who has followed improvements in the manufacture of these forks in shape and material knows the great advances made in the prolongation of the normal duration of perception. The longer (with similar excitation) a fork vibrates—*i. e.*, the less it loses from second to second, the

more useful it is for objective measurements, and so much the less will be the errors due to self-deception, inattention, and other causes.

The duration of perception of the latest of Edelmänn's forks is so great that it should satisfy every practical necessity for an objective measurement. The next imperative need will be to furnish a series of such forks as will agree with those on which my experiments have been based. Edelmänn has promised to gauge such a series, from those which he previously furnished to me, to use for a standard series. Having once obtained practical and satisfactory conformity in the dying-out curves, the results of measurements made by all observers can be compared with one another, and we shall have reached a basis for the solution of so important a question as the analysis of disturbances of hearing.

Objective measurements by my tables take all the less time the slighter the deafness, and may be made when the aurist has normal hearing or when he is deaf.

1. When he has good hearing, the fork should be struck so that the deaf person can still hear the sound. Then the threshold value of the affected ear is determined in the usual manner, and the measure is taken, from the moment it is passed, of the time which elapses until the fork ceases for the normal ear. This is the *difference-time*. We then find the position of the threshold value of the deaf ear within the dying-out curves of the forks, to find out from the tables the extent of that amplitude at which the tone died out for the deaf ear.

In doing this we start from the average threshold-value of the normal ear, or, which is the same thing, from the extent of the amplitude by which the tone is inaudible to the normal ear. The amount of this amplitude, the so-called normal amplitude, is known as the middle value, and forms the terminal point of the dying-out curve. We then follow up the dying-out curve by as many seconds as the difference-time amounted to, and read off in the tables the extent of the amplitude, and the number of normal amplitudes at which the tone died away for the diseased ear.

The proportion threshold-value of the amplitudes for the diseases and normal ears gives the basis for objective measurement. We obtain a direct expression of the hearing of the diseased ear as a fraction of the normal by making its acuteness inversely proportional to the square of the amplitudes. If, for example, in measurements with the *C* fork the threshold-value amplitude is three times the normal, then the hearing of the diseased ear is one-ninth of the normal.

Since the tables give for every amplitude the number of normal amplitudes therein contained, the hearing of the diseased ear can be reckoned in fractions of the normal hearing. All that we have to do is to multiply the number of amplitudes contained in the threshold-value amplitude, and to make the product a fraction, the numerator of which is 1.

Examination of patients variously deaf has shown that in considerable deafness the damage which the hearing has suffered is surprisingly great, whilst diminution of from one-third to one-half is regarded as of slight consequence.

Objective measurements can be made by a deaf aurist if he first has his own defect tested by one with normal hearing. He then proceeds as one with good hearing, except that if the patient is deafer than the aurist his personal difference-time is to be added to that between his ears and that of his patient, in order to discover the difference-time of the patient compared with one of normal hearing. Then by the tables he can find the threshold-value amplitudes and the hearing as a fraction of the normal.

If, contrarily, the examining aurist is deafer than the person to be tested, then the aurist starts with his own difference-time between his own and the patient's ears from the difference-time previously discovered for his own ears.

The results of tests are noted by either noting the extent of the threshold-value amplitude, expressed in the number of normal amplitudes contained therein, or the hearing acuity of the diseased ear is calculated as a fraction of the normal.

A STUDY OF THE DISTURBANCE OF FUNCTION IN ACUTE PERFORATIVE OTITIS MEDIA.

BY PROFESSOR OSTMANN, MARBURG.

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(From *Zeitschrift f. Ohrenheilkunde*, XLII., No. 3.)

IN a clinical study of a series of cases of acute middle-ear inflammation, with reference to the accompanying disturbance of hearing, the following routine of examination, suggested by Bezold, was adopted :

1. The range of hearing, or the perception for the highest and lowest tones, was tested.
2. The quantitative acuteness, or the time perception for all of the tuning-forks in the entire scale of the human organ of hearing, was tested.
3. The hearing distance, or the distance at which whispered speech could be heard in a closed room, was measured.
4. Weber's test was made.
5. Rinne's test was made.
6. Schwabach's test was made.

To insure accuracy in my analysis only middle-aged subjects were chosen, and only those who were otherwise healthy and who had suffered no former ear trouble. Furthermore, subjects were selected who had some understanding of music and sufficient intelligence to appreciate the importance of the test so as to make their statements as reliable as possible. The patients were instructed in regard to the routine of the examination, but during the tests their eyes were covered in order to exclude a possible confusion and involuntary misstatements. The examinations were

all conducted away from confusing street noises and were repeated several times, this also to avoid error. The treatment instituted in my cases had for its purpose the establishment of free drainage through the ear canal by the use of strips of sterile gauze in the auditory canal and an external compress of gauze and cotton, and at the same time the correction of any affection of the nose or throat which might be present.

My report includes ten cases, nine of which were examined at intervals of one or several days for several months from the time of their entrance into the hospital. In the other case, the first functional test was made on the forty-fifth day of the ear affection, and was repeated at intervals for ten months.

CASE 1.—Female, nineteen years old, was taken with severe earache, tinnitus, and deafness as a result of a cold. Four days later, when she was admitted to the hospital for treatment, the right drum was lustreless and very much reddened, but not bulging. There was some pulsation in the ear, and pain radiating towards temple. No tinnitus. The voice could be heard at 8 to 11 metres. Paracentesis evacuated only a few drops of blood and serum. As the pain continued, the operation was repeated on the following day. Following the second incision, pus began to discharge freely, and in four hours the pain abated. There was still no tinnitus. H. d. (distance at which whispered voice could be heard), $8\frac{1}{2}$ to 10 metres. As the pulsation continued and the redness of the drum did not disappear, the opening in the drum was enlarged on the 9th day. The discharge became copious, then gradually subsided, the perforation in the drum closing on the 13th day. On the 22d day, H. d., 15 metres.

A noteworthy feature of this case was the presence of severe earache in the first seven days, with but slight if any secretion in the tympanic cavity and the subsequent cessation of pain with the beginning of the discharge. The absence of tinnitus was also noteworthy, as was the fact that the upper limit of perception for the Galton whistle was never lowered.

CASE 2.—Male, nineteen years, had been suffering with ear-

ache on the left side for two days before his admittance to our clinic. For several hours he had noticed a sound as though wind were rushing from the ear and his hearing had been defective. Examination revealed a diffusely reddened drum with considerable bulging in the posterior-inferior quadrant. At the apex of the tit-like protuberance, a bead of pus could be seen exuding from a small opening in the drum. H. d., 9 to 10 metres. The apex of the protruding portion of the drum was abscised and gauze inserted in the ear canal. This was followed by a serous discharge and relief of pain. Four days later, the perforation in the drum had closed, the redness was disappearing, and the subjective noises had become less severe. H. d., 11 to 14 metres. When the patient was discharged, eleven days after admittance, the drum appeared normal and the subjective noises could be heard only by closing the ear canal with the finger. Three days later it disappeared entirely. H. d., 14 to 15 metres.

This case was of interest on account of the mildness of the attack, the slight subjective noises, and the rapid recovery after abscising the protruding portion of the drum.

CASE 3.—Male of twenty-one years, who, four days before he applied for treatment, had an acute coryza, accompanied by severe pain in the left ear, deafness, and subjective noises. H. d., when admitted to the hospital, $4\frac{1}{2}$ metres. No temperature. The drum was incised and a profuse discharge followed. However, pain continued for six days, as did the subject noises, which were compared to the rushing of water. There was also an occasional pulsation. The temperature on the 6th day was 38.5° . After the 6th day the pain and subjective noises gradually subsided, but the profuse discharge of pus continued. By the 12th day it had lessened somewhat and the drum was beginning to lose its redness. Some slight noises continued in the ear. H. d., $3\frac{1}{2}$ to 4 metres. By the 17th day the opening on the drum had closed, the noises were only occasionally noticeable, and h. d. 4 to 6 metres. A week later, when the patient was discharged, the drum appeared normal and the whispered voice could be heard at 15 metres.

This was a moderately severe case in which there was no elevation of temperature before the 6th day. A noteworthy feature was the profuse discharge of pus for eight

days. The subjective noises were marked at the height of the ear affection and began to diminish on the 10th day, could still be heard by putting the finger in the ear on the 27th day, and did not disappear until the 30th day.

CASE 4.—Male, twenty-one years old, was taken, eight days before he applied for treatment, with lancinating pains radiating over the entire left side of the head. The origin of the ear affection was unknown. After four days of earache, deafness, and subjective noises, the ear began to discharge pus spontaneously, which was followed by lessening of the pain and noises. Five days after rupture of the drum the patient applied for treatment. The posterior-inferior quadrant of the drum was bulging and was marked by a small perforation from which muco-pus was discharging. There was also an opening in the anterior-inferior quadrant, as large as a pin-head. Subjective noises, which had been complained of, had by this time disappeared. Temperature normal. H. d., $\frac{1}{2}$ to 2 metres. By the 8th day the discharge had grown considerably less. The drum was still injected and was bulging posteriorly. A week later, both holes in the drum had closed, the membrane having a grayish-white appearance, and the outlines were plainly visible. H. d., 15 metres.

The middle-ear affection in this case evidently had its origin in the naso-pharyngeal inflammation. It was a mild case and improved rapidly after incision of the drum, the pain and subjective noises disappearing rapidly, and the drum and function returning to normal in twenty days.

CASE 5.—A boy of thirteen years, who had been treated for an acute middle-ear inflammation on the left side three years previously, but who had regained perfect function. He had a naso-pharyngeal catarrh. During an acute attack of rhinitis, nine days before his admittance to our clinic, he was taken with a severe aching of the left ear, followed on the next day by spontaneous perforation of the drum, a free serous discharge, and relief of pain. The drum was red and was marked on the posterior-inferior quadrant by a small opening from which serous fluid was exuding. There was no fever. The patient complained of considerable roaring and pulsation in the ear. H. d., 6.5 to 8 metres. The perforation in the drum was enlarged. Two days later, paracentesis had to be repeated, as the discharge had

almost stopped and the drum was again bulging. The otorrhœa became more copious, and after two days gradually began to subside. After a week, the drum was pale, the noises had almost disappeared, and h. d. was 10.5 metres. Two weeks after beginning of the trouble, the perforation in the drum had closed, and the drum, with the exception of slight redness over Schrapnell's membrane, had returned to normal. There were no subjective noises. H. d., 11.5. When discharged, four days later, he had normal hearing; h. d., 15 metres. Ten days later, conditions had not changed. Two months later, the redness of Schrapnell's membrane was no longer present, but he had a h. d. of only 12 metres.

The features of this case were the copious discharge for nine days and the gradual lessening of the discharge after enlargement of the perforation in the drum, with the disappearance of the subjective noises six days later. The continued redness over Schrapnell's membrane seen in this case was an unusual feature; also the return of hearing to normal and a subsequent decrease in hearing.

CASE 6.—A male, thirty-five years of age, who had had rhinopharyngitis for several days, was taken, five days before he applied for treatment, with pain in the left ear, followed by defective hearing and subjective noises. After three days, the drum ruptured spontaneously and the pain and noises stopped almost at once. When first seen at the clinic the posterior portion of the drum was red, and in its posterior-inferior quadrant was bulging, and contained a small perforation, from which a scant discharge was noticeable. The patient complained of whistling and roaring noises and occasional pulsation in the affected ear. No fever. Hearing so defective that words could not be understood. The protruding portion of the drum was incised and in twenty-four hours the noises had diminished, and patient could hear whispered voice at 2 to 3 metres. A second paracentesis was made three days later, as the old opening had closed and the membrane was still bulging. This was again followed by a copious discharge. Following this there was a gradual lessening of the redness of the drum and a rapid disappearance of the tinnitus, and by the 11th day patient had h. d. 9.5 to 13 metres. This patient was not seen again for almost two months. The drum was then slightly retracted, the

perforation had closed, and the drum appeared gray and lustreless. H. d., 14 metres.

This was a mild case beginning with an acute nasopharyngitis. The subjective noises lasted for eleven days, then disappeared rather suddenly, simultaneously with an improvement in function.

CASE 7.—Male, twenty-three years old, four days before applying for treatment had an acute coryza, followed by earache on the left side. The pain continued, and one and a half days before his admission to the hospital the left ear began to discharge pus. Subjective noises—roaring—began soon after beginning of the earache and apparently became more severe after rupture of the drum. Examination revealed redness of the drum and the ear canal in close proximity of the drum.

A scant serous discharge was noticeable in the posterior-inferior quadrant exuding from a minute perforation in the drum. The patient complained of throbbing in the ear and considerable roaring. He was unable to hear the voice close to the ear. Temperature 38° C. The perforation in the drum was enlarged, but for two days the discharge remained unchanged. The redness, however, lessened and the pain subsided. Roaring continued. By the fourth day the patient could hear sounds at 3 metres but was unable to recognize words. On the seventh day whispered words could be recognized close to the ear. The discharge stopped on the tenth day. By this time h. d. was 3 to 6 metres. Ten days later only a faint redness was visible along the malleus and patient was discharged. It took twelve more days for the hearing to return to normal.

The features of this case were the elevation of temperature lasting for several days, the marked decrease of hearing during the climax of the disease, and the beginning of the subjective noises with the onset of the pain, and their continuance for twelve days.

CASE 8.—Male, twenty-one years old, had an ear affection of short duration in 1896, the nature of which could not be determined, and after which there was complete restoration of function. Two days before the patient presented himself for treatment he had pain in his throat, which was followed by severe pain in

the left ear, and later defective hearing and subjective noises. Temperature 38.5° C. Examination on the third day revealed a very much reddened drum, the posterior part of which was protruding and contained a vesicle at its apex. Pain and subjective noises were still complained of.

The pharynx was inflamed. H. d., 0.5 to 0.75 metres. Incision of the drum evacuated quite a quantity of sero-sanguineous fluid, and was followed by a rapid improvement in the general condition of the patient. The discharge continued profusely for about seven days, then gradually subsided. The noises in the ear, which were of a hissing character, continued. As the drum was still red on the ninth day, there was a slight elevation of temperature, and as the h. d. was only 0.3 metre, a second paracentesis was performed. A free discharge followed for several days, then the flow continued less profusely for thirty-seven days before the perforation closed. The temperature remained slightly elevated for several days after the second operation, and the subjective noises continued. Two weeks after the beginning of the trouble, h. d. was 1.25 to 2 metres, and at the end of a month it had increased to 4 metres. Thirty-seven days after the beginning of the trouble, the drum was complete, and, with the exception of the membrana Schrapnelli, had its normal color and appearance. The subjective noises, which were compared to the rushing of water, continued. H. d. 9.5 metres. This patient was last examined eighty-four days after the origin of the otitis. The drum appeared slightly thickened and somewhat retracted. The subjective noises were still present though not pronounced. The Eustachian tube was permeable. H. d., 14 metres.

The exceptionally long and profuse discharge, lasting for five weeks, was of interest in this case, as was the persistence of the elevated temperature after the discharge had been established. The beginning of the subjective noises with the onset of the otitis and continuance after subsidence of the ear affection was also worthy of special note.

CASE 9.—Male of twenty-one, with history of some non-perforative ear affection two years previously with recovery of perfect function. Ten days before applying for treatment he was suddenly taken with severe earache on the right side during an attack of pharyngitis. The pain in the ear was followed on the next day by subjective noises and deafness. There was no

discharge. These symptoms continued until patient presented himself at the clinic. Examination showed drum and ear canal red, and drum bulging in the posterior portion. The patient was unable to hear the voice close to the ear. The posterior-inferior quadrant of the drum was incised, following which the noises ceased almost at once and the ear began to discharge pus profusely. On the following day his h. d. was 3 metres. The discharge continued only four days, and two days later the perforation in the drum had closed and the redness much diminished. H. d., 9.5 metres. Several days later a small calcareous area was noticeable in the anterior half of the drum. Six months later, when this patient was examined again, the drum was slightly atrophic and retracted. H. d., 7 to 8 metres.

This was a very mild case, the otorrhœa which followed the paracentesis subsiding in five days, and the subjective noises ceasing within twenty-four hours after incision of the drum. Normal function was never recovered.

CASE 10.—This was a case of bilateral, perforative, middle-ear suppuration following tonsillitis in a patient who had no history of former ear trouble. The patient, a man of twenty years, did not apply for treatment until he had been sick for forty-five days, and then only on account of the annoying subjective noises. He gave the history that his trouble began with a severe earache on both sides lasting for seven days. Paracentesis on the sixth day gave him no relief, the attending physician noticing that the mucous membrane of the tympanum presented in the wound after the incision of the drum. Temperature then 40° C. On the following day a sero-sanguineous discharge began which lasted for four weeks. Subjective noises on the left side continued. Examination on the forty-fifth day showed considerable difference in the acuteness for different words, some being recognized at 14 metres, while some were recognized at only the fraction of a metre. This continued for some time, and even after eleven months when some words were understood at 15 metres others could be heard at only 6 to 7 metres. Subjective noises were still complained of at the end of a year.

ANALYSIS OF CASES.

A. *Range of Hearing.*—Very little attention is given in our text-books on otology to the effect of acute middle-

ear inflammations upon the range of hearing. Burkhardt-Merian has made the observation that the presence of an exudation in the tympanum seldom affects the perception for high tones, and when it does he accounts for the defect in a pressure on the fenestra ovalis, or an increased pressure in the labyrinth. In a patient in whom the drum was absent, he made the observation that direct contact of the fenestra ovalis with a cotton probe saturated in glycerine was followed immediately by a decrease in the power of perception for high notes. Bezold has noted, in eighteen cases of acute purulent otitis media with permanent perforations or marked scar formation, a decrease in the perceptive power for high notes tested with the Galton whistle. One of the cases also showed an inability to perceive some of the lower notes. The defects were accounted for by Bezold in the disease of the labyrinth. Brunner also attributes the loss of perception for high notes to temporary involvement of the labyrinth. Habermann and Moeller have noticed that the defects in the high tones of the Galton whistle extended in most cases as low as c^5 or c^6 , and in some cases to c^7 . I have been able with my cases to corroborate the observations of these authors, as in all but one instance the high limit of perception was reduced. The amount of reduction was very variable, the high limit of perception in two cases being as low as d^8 . The observation was also made in my cases that the low limit of perception is affected more frequently than is generally believed, as an elevation in the low limit was noted in every one of the cases. The normal limits, both for low and high tones, were again reached after the inflammatory symptoms subsided. The elevation of the low limit has been explained in a diseased condition of the sound-conducting apparatus, and a consequent poor conduction of low notes. The lowering of the high limit is believed to have its cause in disease of the labyrinth. From my observation it is evident that a prognostic significance can be attached to the lowering of the upper tone limit. Based upon clinical experience, we may conclude that the greater the extent of the reduction of the upper tone limit and the longer the reduction, the

less the probability of a rapid recovery from the disturbance of function and the less the probability of the disappearance of the subjective noises.

No satisfactory explanation has been offered for the involvement of the labyrinth in these cases. In the less severe cases, where the upper limit of sounds was lowered for only a few days, a slight inflammatory condition, or hyperæmia of the labyrinth, was probably present. Not so in the severer cases, where the lowered high limit continued after all inflammatory symptoms had disappeared. According to the histological examinations of Habermann, a plastic inflammation takes place in the inferior portion of the tympanum, the extension most likely taking place through the fenestra rotundum. The observation of Burkhardt-Merian that the upper range of perception was lowered by making pressure on the fenestra rotundum with a cotton probe has suggested the possibility of an exudation on this membrane as a cause of this phenomenon, during acute otitis media. However, to justify this theory, the hearing for high tones would have to be re-established with lessening of the exudation, which, in my observation, has not been the case. The defect in the upper range of hearing in my cases usually began or became exaggerated soon after the paracentesis, and continued in several instances for some time after the inflammatory symptoms had disappeared.

B. Time Perception.—Tests made according to the routine suggested by Hartmann to determine the disturbance in the time perception for the octaves C — c⁴ during the course of acute middle-ear inflammations showed that the lower octaves were most affected. For the high octaves, the time perception was shortened in a varying degree in nearly every case, but the normal time perception was regained rapidly in all but two cases. In one of these it took eleven and a half months for a slight reduction in the time perception for the octaves c³ and c⁴ to disappear. The interesting clinical observation was also made that the diminished time perception for the higher octaves stood in direct relation with the subjective noises. In the one case in which the otitis ran its course without subjective noises,

the time perception for the high octaves was also not affected, and in the two cases in which the ringing noises continued for a considerable time after the subsidence of the otitis a lessened time perception for the high octaves was also noted for a long time. This would justify the conclusion that the two symptoms are associated, and that they have a common cause, probably circumscribed pathological changes in the cochlea.

C. Hearing Distance for Speech.—The functional examination of the ear, as tested with speech, is not of great value for scientific research. The method is unreliable, owing to errors of judgment and frequent inattention on the part of the patient and the impossibility of the surgeon to speak with the same strength of voice and with the same distinctness at each examination. Notwithstanding these imperfections in this test, the degree of deafness for speech can be fairly well determined, and serves as an aid in determining functional defects. A certain relation was found to exist between the decrease in the hearing distance and the lowered upper range of perception for the Galton whistle, as well as a lessened time perception for the higher tuning-forks (c^3 and c^4), which would suggest a common cause of these disturbances—probably a diseased labyrinth.

D. Weber's Test.—In all of my cases, the tone of the tuning-fork on the vertex was perceived most distinctly on the affected ear. It is a noteworthy fact that normal conditions or equal perception on both sides were regained in but four out of the nine cases. In two of the cases perception was increased, and two entirely localized on the affected side for months.

E. Rinne's Test.—Throughout the entire course of all of my cases, a lengthened perception through the bone for the C fork was observed, and in two of the cases it persisted after the ear affection had run its course. Similar observations have been made by Bezold. The time of perception through the bone was subject to daily variation in my cases, but in nearly all of them reached its maximum during the last stages of the otitis, and not at the height of the disease, when the air perception was shortened in duration. In most

of the cases, the time perception through bone began to increase as soon as the height of the inflammatory attack was passed, but the time perception through bone continued to increase for several more days, when a rapid increase through bone and decrease through air followed. From these observations we can deduce that certain conditions exist at the height of an acute perforative middle-ear inflammation, which reduces the perceptive power through the air and increases the time perception through bone. It is probable that both the sound-conducting and sound-perceiving apparatus is involved in acute middle-ear inflammation. The degree of the involvement of the primary tympanic disease and the secondary vestibular affection varied in different cases. The increase in bone-conduction, after the ear trouble had apparently run its course, can only be explained in a subsidence of the inflammatory condition within the labyrinth and tympanum and a subsequent increase in rigidity of the ossicles. After continued improvement in the inflammatory condition in the middle ear, conditions grew less favorable to bone-conduction and more favorable to conduction by air.

ANNUAL REPORT OF THE OTOLARYNGOLOGICAL CLINIC AND POLYCLINIC (PROF. SIEBENMANN) IN BASEL.

FROM JANUARY 1 TO DECEMBER 31, 1902.

COMPILED BY DR. E. OPPIKOFER, FIRST ASSISTANT.

Translated by Dr. A. WIENER, New York.

(From *Zeitschr. f. Ohrenheilk.*, Vol. XLII.)

THE number of patients treated in the Polyclinic between the years 1901-1902 was 3687. The majority ranged between the ages of one and fifteen years. Out of 2793 patients treated, the external ear was involved 730 times, the middle ear 1799, and the inner ear 264 times. In the Clinic, during the same period, there were treated 366 patients. The majority of these suffered from middle-ear disease. There were 147 operations performed. The simple opening of the mastoid was done 50 times, and the radical operation with plastic, according to Siebenmann, 63 times. Attention is called to the absence of perichondritis in cases operated on by this method.

The following cases reported are of interest.

Otitis media purulenta non perforativa on the right side, with perisinuous abscess and infected sinus thrombosis. Pyæmia. Metastases in the lungs and pleura. Enlargement of the liver and spleen. The contents of the sinus was removed and the jugular was tied. Recovery.

Patient was twenty-five years of age. Admitted on the 2d of March, and discharged on the 24th of April.

After an attack of influenza, with an involvement of the accessory sinuses of the nose, there occurred an acute otitis media on the right side, with recurrent attacks of pain. After suffering several days, he presented himself at the medical clinic, where a provisional diagnosis of erysipelas was made. A few days later there occurred a bronchitis on both sides, which, however, rapidly subsided. The continuous high temperature and the recurrence of pain in the ear, although insignificant, finally led to a second otoscopic and ophthalmoscopic examination, with a resulting diagnosis of purulent sinus thrombosis. An operation was performed and revealed a perisinusitis and broken-down thrombus in the sinus. The jugular was tied. Following the operation, metastases showed themselves in the pleura and lungs, which, however, after fourteen days disappeared. Attention is called to the fact that the tying of the jugular, when the diagnosis of thrombosis of the bulb is positive, should be performed before opening the mastoid (Brieger).

In this patient with pyæmic symptoms and pain to pressure over the retromaxillary region, a diagnosis of thrombosis of the bulb and jugular vein was almost a positive fact. The operation, however, revealed the retromaxillary pain as due to an infiltration in the tissue around a terminal cell in the mastoid process. In regard to optic neuritis, the author feels that, although the statistics are not sufficiently convincing to draw any positive conclusions therefrom, probably in purulent sinus thrombosis its occurrence is rather to be expected.

Chronic otitis media purulenta on the right side, with purulent sinus thrombosis; metastatic abscesses in both pleural cavities and lungs. Hemorrhages in the mucous membrane of the bladder. Operation. Death.

Patient seven and a half years of age. Admitted on the 1st of January, 1902. Died on the 4th of January, 1902.

On admission, the somnolence, the violent headaches, high temperature, the catarrhal symptoms in the lungs, in connection with the ear findings, pointed toward a pyæmia due to a purulent sinus thrombosis. The diagnosis was strengthened by the previous history of chills and vomiting, which ceased to occur just previous to his admission into the hospital. The operation,

which was performed on the first day of admission, showed that the external and anterior wall of the transverse sinus in the neighborhood of the bulb was necrotic. As soon as the bone was removed, fetid pus at once presented itself. The sinus was cleaned out, but the jugular vein was not tied.

The author comments upon this fact, especially in regard to a hemorrhage which took place from the jugular bulb three days after the operation. He believes that had the jugular been tied early it might have been of some advantage. In regard to the pyæmic and metastatic abscesses which the autopsy showed to be of some duration, he believes that the advantage to be gained by tying the jugular in this case would have been questionable. The occurrence of the colon bacillus as a bacteriological finding in sinus thrombosis is particularly emphasized, as its occurrence is uncommon. The anatomical diagnosis at the autopsy confirmed the clinical diagnosis.

Left-sided perisinusitis after acute catarrhal otitis media. Hearing at the time of the operation normal. Recovery.

Patient twenty-five years of age. Admitted January 30, 1901. Discharged March 5, 1901.

At the time when the patient came under observation, the inflammation in the middle ear had ceased to exist. The tympanic membrane appeared normal, and the hearing distance for a whisper was 22mm. While the middle ear was in a state of recovery, a pus-secreting cell of the mastoid process in the neighborhood of the sinus led to a perisinuous abscess and a perforation into the posterior fossa. Eventually the pus found its way through the emissarium mastoideum, and appeared as a superficial abscess under the periosteum of the skull. With the exception of pain, which was present only in the beginning, this extradural abscess caused no symptoms whatsoever. Three weeks after the appearance of the subperiosteal abscess, vertigo, a slight rise in temperature, and the Romberg phenomenon made their appearance. The bacteriological examination showed a pure culture of pneumococcus.

At the operation, the antrum was not opened. The author follows the rule that, in uncomplicated cases of empyema of the mastoid process, the antrum is not opened when the otoscopic

examination and the test for hearing show that the disease in the middle ear is quiescent, and, furthermore, when during the operation the bone in the neighborhood of the antrum is found healthy. In doubtful cases the antrum is laid bare.

The author takes occasion to give some statistics in reference to the etiology and occurrence of extradural abscesses as seen in his clinic.

Contrary to the general rule, they appeared to occur more frequently on the left side. On the other hand, the more serious complications, like sinus thrombosis, meningitis, and brain abscess, commonly occurred on the right side. Complications were more frequently witnessed after acute pain, chronic middle-ear disease. The male individual was more often affected than the female. In regard to age, the majority occurred between thirty and forty years of age.

Chronic otitis media purulenta on the left side, with empyema of the mastoid process and necrosis of the facial nerve; acute otitis media purulenta on the right side. Tuberculosis of the larynx, lungs, and intestines. Tubercle in the cerebellum and pons.

F. J., age six months. Admitted 27th November, 1900. Died 30th June, 1901.

After measles there occurred a purulent disease of the middle ear, with empyema of the mastoid process on the left side. As the temperature was very slight, and the lungs and other organs normal, the prognosis appeared apparently good. At the operation, however, from the extensive necrosis which was revealed, together with the result of a microscopic examination of some granulation tissue which was removed from the antrum, the nature of the process was shown to be tubercular.

The author, on account of the negative findings in the lungs early in the disease, puts the question whether the tuberculosis present in the middle ear was the primary source of infection. He believes with such an extensive tuberculosis of the inner organs as the autopsy revealed, that probably after all at the beginning of the ear disease there existed some diseased bronchial glands and deep-seated lesions in the lungs, which could not at that time be demonstrated.

As these did not become manifest until months after the beginning of the otorrhœa, the infection could not be carried by sputa through the Eustachian tube, but was rather of hæmatogenous origin.

The necrosis present in this child when it died was an extensive one. It involved the os tympanicum, all the walls of the tympanic cavity, together with the aditus antri, antrum, and mastoid process. The dura of the middle fossa was laid bare, but no infection of the brain cavity resulted. The Fallopian canal in the posterior wall of the tympanic cavity was empty, showing complete necrosis of the facial.

Sarcoma of the right middle ear, involving the labyrinth and both cranial fossæ. Operation. Death.

L. S., seven and three quarters years of age. Admitted December 6, 1900. Died January 7, 1901.

Patient had suffered from a tubercular affection of her skin and bones. A facial palsy appears on the right side. At the same time there is discovered in the auditory meatus a growth, which although removed several times nevertheless quickly recurs. There is no otorrhœa, but partial deafness exists in this ear.

The hearing test shows the characteristic findings for middle-ear disease. The electrical examination of the facial nerve shows the reaction of degeneration. Microscopic examination of the growth revealed it to be a spindle-celled sarcoma. The growth could not be completely removed through operative means. It had extended toward the mastoid process and also toward the brain. The tegmen was wanting over the tympanic cavity, antrum, and aditus. The tumor soon began to grow into the wound and into the external canal of the ear. Its growth into the middle fossa soon brought on brain-pressure symptoms: optic neuritis, third- and fifth-nerve paresis on the right side, together with a paresis on the opposite half of the body. The patient finally became comatose, and died half a year after the recognition of the first symptom, which was facial palsy. The autopsy revealed a tumor, about the size of a billiard ball, encapsulated, extending through the tegmen tympani and dura into the middle fossa, forcing the brain over against the opposite side of the skull. A second tumor was also found, about the

size of a cherry, which appeared to grow from the meatus auditorium internum into the posterior fossa. Microscopic examination proved this tumor to be a polymorphous-celled sarcoma. The intercellular substance in the main tumor was of a hyaline nature.

The author believes that the tumor primarily took its origin from the tympanic cavity. What strengthens this view is its behavior towards the dura which was attacked only in circumscribed places. Again, the presence of longitudinal fibres in the pedicle pointed directly towards the middle ear as the point of origin. The early appearance of the facial palsy before any cerebral symptom also speaks for the middle ear. Author goes so far as to place the probable point of origin at the junction of the aditus and antrum. He believes that in the early stages of sarcoma of the middle ear it is almost impossible to make a diagnosis. Pain, which is so characteristic a feature in the early stages of other malignant tumors, is wanting in sarcoma.

Early paralysis of the facial nerve is usually a very prominent symptom in all forms of tumors. In addition, usually an examination of a portion of the growth decides the matter, but not always. The author calls attention to the bad prognosis, as the diagnosis is usually made in the operable stage. That the epithelium of the mucous membrane of the middle ear may become horny through the influence of a malignant tumor is well shown in this case. This is contrary to the Habermann-Bezold theory, which attributes this horny condition only to the wandering into the middle ear of epidermal cells.

Chronic otitis media purulenta on the left side with cholesteatoma and suspicion of an intracranial complication. Temporary resection of the skull. Death. Glioma of the fourth ventricle.

W. G., twenty-two years of age. Admitted on the 9th of May, 1901. Died on the 11th of May, 1901. In a young, strong, male individual, with purulent middle-ear disease on one side and the remains of such on the opposite side, there were present, increasing in severity, symptoms of brain pressure. Exploratory

opening in the middle and posterior fossæ gave negative results; but strengthened the suspicion of a brain tumor. No clue was obtained in regard to the location. The patient rapidly succumbed. The absence of all symptoms pointing toward an involvement of the hemispheres, in addition to the absence of any disturbance of the auditory apparatus, and the prominence of the cerebellar symptoms, speak, as the author suggests, in all probability against the diagnosis of abscess.

The absence of fetid pus or profuse secretion at first persuaded him against operation.

A microscopic examination made of a number of sections in series of both labyrinths fails to substantiate the fact that increased brain pressure must produce functional and anatomical changes in the labyrinth. Not the slightest sign of any depression of Reissner's membrane was to be found. An interesting observation in this case is the author's explanation how cholesteatoma can originate, through the retraction and pressure inwards into the aditus of an atrophic tympanic membrane. This eventually becomes perforated at its most dependent portion, and thus the path is opened for the wandering into the aditus of epidermis. It supports the theory of Bezold, that the retraction of the tympanic membrane in catarrhal condition of the Eustachian tube and naso-pharynx is one of the contributing factors in the production of cholesteatoma.

Abscess in the left orbit, due to the rupture of a caseous empyema of the antrum of Highmore and ethmoidal sinusitis into the orbit. Metaplasia of the mucous membrane of the antrum of Highmore. Two operations. Recovery.

W. B., age thirty-nine years. Admitted on the 15th of August, 1902. Discharged on 27th of September, 1902.

A male, thirty-nine years of age, was afflicted with what apparently appeared as an acute purulent inflammation of the accessory sinuses. After one week he appeared to have recovered. After four days, however, he was attacked with severe headache and the appearance of a purulent secretion from the nose. Two and a half weeks after the first symptom of his illness, he developed the typical picture of an orbital abscess. The operation

revealed two perforations into the orbital cavity. The one was about $\frac{1}{4}$ cm in size, and lay on the floor of the orbit at the posterior superior angle of the antrum of Highmore. The other was about the size of a pin's head and represented the middle ethmoidal region (an opening for a third vessel which was enlarged through caries).

The cause of this entire condition was attributed to the diseased antrum, which was filled with a most ill-smelling caseous mass. On the other hand, the ethmoidal cells merely showed a discoloration and catarrhal condition of the mucous membrane and the contents of the cells not abnormal.

The author comments upon the fact that small canals in bone, which serve for the passage of veins, as well as a thin wall or dehiscence, very often assist and make easy such perforations as took place in this case. He explains their origin as follows: Through the pressure of the accumulated exudation and its accompanying virulence, brought about through an acute exacerbation, small areas of necrosis or serious nutritive disturbances take place in the already inflamed mucous membrane. Under the influence of a rarefying otitis or periostitis, brought about by carriers of infection from such a mucous membrane, a perforation eventually takes place. The chill and the further spread of the infection through such a vessel opening demonstrate the fact that the patient suffered from a phlebitis or beginning pyæmia. The case is of especial interest because it is the first case in which a metaplasia of the mucous membrane of the antrum of Highmore has been demonstrated. In this case there was found a deep red, markedly thickened mucous membrane with uneven surface. Within the folds nothing but stratified pavement epithelium could be seen. The microscope thus reveals that the author had, in the beginning, to deal not with an acute accessory sinusitis, but an acute exacerbation of a latent empyema of the antrum of Highmore and a similar condition in the ethmoidal cells.

In regard to the prognosis of an empyema of the antrum with ill-smelling caseous contents, it appears to be particularly favorable. According to Avelli and others, complete recovery has been observed after one washing out of the

cavity. The author's case, however, is one which did not respond so readily to treatment. Whether those cases in which the mucous membrane has undergone a metaplastic change are especially unfavorable remains at present an open question. The author calls attention to the fact that in purulent disease of the middle ear the complicating metaplasia and its association with cholesteatoma formation is a very serious matter, leading very often to sinus thrombosis. He then speaks of the analogous condition which may attend metaplasia of the accessory sinuses, viz., phlebitis and periphlebitis of the ethmoidal and ophthalmic veins.

The outcome of the above case was a particularly favorable one. The vision remained normal, and after the abscess was drained the symptom of the orbital phlegmon disappeared. The ethmoidal cells were opened from the orbital cavity and curetted. The antrum was opened from the canine fossa.

Alveolar periostitis of the superior maxilla. Orbital abscess. Purulent breaking down of the internal pterygoid plexus and purulent thrombosis of the cavernous sinus. Pyæmia. Exposure of the cavernous sinus. Death.

E. L., thirty-three years of age. Admitted on the 10th of March, 1902. Died on the 26th of March, 1902.

Patient complained at first of pain over the right superior maxillary bone. The upper right canine tooth was carious and tender to pressure. This tenderness was also evident over the posterior portion of the canine fossa, and in the neighborhood of the right superior maxillary articulation. After the tooth was extracted there was found a simple periostitis without any accumulation of pus. On admission to the hospital the diagnosis of an abscess in the right orbit was made. There was marked exophthalmus and all the movements of the eyeball were limited. The conjunctiva was chemotic. There was ptosis with œdema of the upper lid. In addition there were excruciating headache, high temperature, chills, vomiting, loss of appetite, and constipation, symptoms which are commonly seen in orbital abscess.

The question of interest in this case, which the author discusses, is from what source did the abscess in the cellular

tissue of the orbit take its origin, and then thus to trace its farther course into the sinus cavernosus.

That an orbital abscess may be traced to an affection of a tooth is known, but it is very uncommon. What is especially to be emphasized in this case is the apparently insignificant inflammation around the tooth, with the consequent formation of an abscess in the orbit. The author calls attention to the case of Pagenstecher, which was very similar to his own.

In regard to the explanation offered as to how the infection found its way from the tooth into the orbit and sinus cavernosus, the author proceeds as follows: He traces the infection to the internal pterygoid plexus producing here a thrombophlebitis with consequent purulent disintegration. He then argues the question, whether from this point the orbital tissue was next involved, and following this the cavernous sinus, or *vice versa*, or whether both were involved about the same time and independently of each other. He believes that the orbital phlegmon preceded the sinus thrombosis, on account of the prominence which it assumed early in the disease and the satisfactory explanation which is offered for all the symptoms present. The author does not wish to claim, however, that the cavernous-sinus thrombosis may not, after all, have been the first result of the infection. Such a thrombosis with a thrombophlebitis of the ophthalmic vein may resemble the picture of an orbital phlegmon. Of interest in this case is also the fact that the thrombosis of the cavernous sinus remained confined to one side. The explanation offered is based upon the histological and bacteriological findings of Mitvalsky in cases of this kind. He found that, at the point of junction with other vessels, real thrombi form which, in spite of the colonies of bacteria in their neighborhood, remain free from infection, and offer the greatest resistance to the spread of the infectious process.

Ten days after the first appearance of the exophthalmus the vision was reduced to half. This was attributed to pressure upon the optic nerve within the orbit. It is not denied, however, that such reduction of vision may be

brought about by a thrombophlebitis of the central vein or an optic neuritis. An optic neuritis was discovered later in the disease, but is attributed by the author to the operation of laying bare the cavernous sinus.

In the above case the carious tooth was extracted, the antrum of Highmore opened through the canine fossa, and the orbit at its floor. The intraorbital pressure was at once diminished, but the multiple small abscesses in the orbital cavity remained undisturbed. The author believes an incision at the orbital margin with drainage to be preferable to opening the orbit from the antrum, even in an apparently hopeless case. He calls attention to the single remarkable case of Stocker, which was successfully treated in this manner.

As the patient's general condition did not improve and the case began to look more serious, it was thought that probably after all the symptom-complex was not brought about by the periostitis around the carious tooth, but by the chronic purulent ear-disease which also existed in the right ear of this patient. The patient was absolutely deaf in this ear, and it was thought that probably the labyrinth had been involved. (Later the microscopic examination simply showed a marked catarrhal inflammation of the mucous membrane of the middle ear. Otherwise everything was normal. The deafness was probably of central origin.) For the above reason the transverse and cavernous sinuses were laid bare and found to be normal. Had the cavernous sinus been opened, the author believes that pus might have been found. The results following the opening of the cavernous sinus are not encouraging. The author has found in the literature four cases. Only in one case, that of Knapp operated upon by Hartley, in which an aseptic thrombus was found, in a patient suffering from a traumatic sarcoma of the orbit, so far as the direct result was concerned was the outcome favorable. The patient died, however, a few months later from a recurrence of the growth.

REPORT OF TWO CASES OF MASTOIDECTOMY,
SINUS THROMBOSIS, LIGATION AND RESEC-
TION OF JUGULAR VEIN; RECOVERY.¹

By J. F. MCKERNON, M.D., NEW YORK.

(*With one temperature chart.*)

The first case is a child, twenty-six months old, male, well nourished, and, save for an acute otitis one year ago, had never been ill before. The case was seen on Feb. 15, 1905. There had been a rupture of the left drum-membrane two days previous. Upon examination, the external auditory canal of the right side was found filled with a muco-purulent discharge, the drum membrane was bulging; in the posterior quadrant there was a small opening just above the tubal entrance into the middle ear. A smear of the discharge was taken, which upon examination proved to be a staphylococcus infection. There were no physical signs within the canal or externally of mastoid involvement. The temperature was 102° F. and the child somewhat drowsy. The drum membrane was incised, and the temperature in twelve hours was 99° F. For the next four days the ear drained freely, the temperature at no time being above 100° F. On the fifth day there was a rise of temperature to 103.2° F., the physical signs in the canal and middle ear showed beginning involvement of the mastoid, and there was some tenderness of the mastoid on pressure. The temperature remaining the same, the mastoid was opened on the following day, and contained only a very few drops of pus in the antrum, there being no general involvement of the structure.

For the next nine days the child did very well, the temperature at no time rising above 100° F. The wound looked healthy, except a small spot over the sigmoid groove at the knee, which

¹ Read before Section on Otology, N. Y. Academy of Medicine, April 13, 1905.

was not covered with granulations. On the tenth day there was a gradual rise of temperature to 103° F. The child was fretful, did not rest well, and did not take his food without coaxing. During the night the temperature dropped to 99° F., and on the following day reached 103.5° F. Upon inspection of the wound at this time it was found looking badly. All the granular surface was bathed in pus, and there had exuberant granulations grown over the spot on the groove, before spoken of, which were flabby and also bathed in pus. The wound was cleansed and a wet dressing applied, and the temperature dropped within six hours to 99.2° F. The child was more comfortable, rested better, and partook of nourishment well. By twelve o'clock the following day the temperature had risen to 104.8° F. The wound was inspected, and the granulations over the sigmoid groove were soft and flabby and bathed in pus. A diagnosis of involvement of the sinus was made, and permission asked to operate, which was granted. The sinus was exposed from above the bulb to one inch posterior to the knee. The dura covering the sinus in this locality was lustreless, somewhat whitish in color, and the sinus was easily compressible. Below the knee the bulb was dark in color, but still retained a grayish tint. It was opened and a clot and broken-down material expelled. Free hemorrhage was established at both ends, a dressing applied, and the child returned to bed. The temperature dropped quite suddenly to 101° F., and remained so for twelve hours, after which there was an abrupt rise to 104.2° F. The child's condition was better, he took his nourishment well, and appeared stronger. For the next four days the temperature ranged between 103° F. and 100.8° F. On the fourth day the temperature rose to 104.2° F., the child refused nourishment, was exceedingly restless, and looked septic. The vein was examined in the neck, but no tenderness or enlarged glands could be discovered. Believing we had a still further source of infection which was probably in the bulb, or vein, or both, permission was asked to operate again. The parents requested a delay for a few hours, and during the next twelve hours the temperature dropped to 101° F. Some two hours after this, the child's hands and feet became cold and clammy, and there was a rise of temperature to 105.2° F. There was no vomiting, the pulse rate was 160, and the child looked very septic. Permission was now granted to remove the vein, which was done under chloroform anæsthesia.

The vein was ligated below the clavicle and resected to its point of exit from the skull. The facial vein was found involved and nearly an inch of this was also resected. There were a large number of infected glands along the course of the vein, and also others lying far posterior to it, one of which was broken down. The sheath covering the vein was thickened in its upper two-thirds. The vein contained a clot for an inch and a half below the skull. The wound was closed with a continuous suture which later had to be removed, owing to suppuration. The case has made an uninterrupted recovery and at the present time is going out-of-doors every day. There was a gradual diminution of the temperature with one or two exceptions, these exceptions probably being due to overfeeding. I show you the temperature chart and also the pathologist's report of the findings in the vein and glands examined.

The second case is that of a woman about thirty years of age, who developed an acute otitis following a partial turbinectomy done by a prominent throat surgeon, and in which the most profound systemic infection followed. The otitis developed twenty-four hours after the turbinectomy was performed. An incision was made in the right drum-membrane, which was found bulging, and pus evacuated. A smear of this discharge showed a large number of streptococci, with a few pneumococci. The temperature at this time was 100.2° F. The mastoid even at this time was exquisitely tender. For the next two days the patient complained of severe pain in her ear, and over the mastoid when pressure was exerted. The temperature did not rise above 100.2° F. On the third day there were physical signs in the canal and middle ear of mastoid involvement and a complete mastoidectomy was done. The bone was found infiltrated throughout, was very dark in color, and the infection extended far posterior to the sigmoid groove. Within a few hours there was a sudden rise of temperature to 103.8° F., and quite as sudden a drop to 98.4° F. For the next six days the case pursued the usual course of a post-operative mastoid, except for a little more fluctuation of temperature than the average; at no time was it above 100.4° F.

On the tenth day following the mastoidectomy there was rather a sudden rise to 103.8° F.; the patient complained of headache, and referred most of her head pain to the vertex. During the night the temperature dropped to 101.8° F., to rise on the fol-

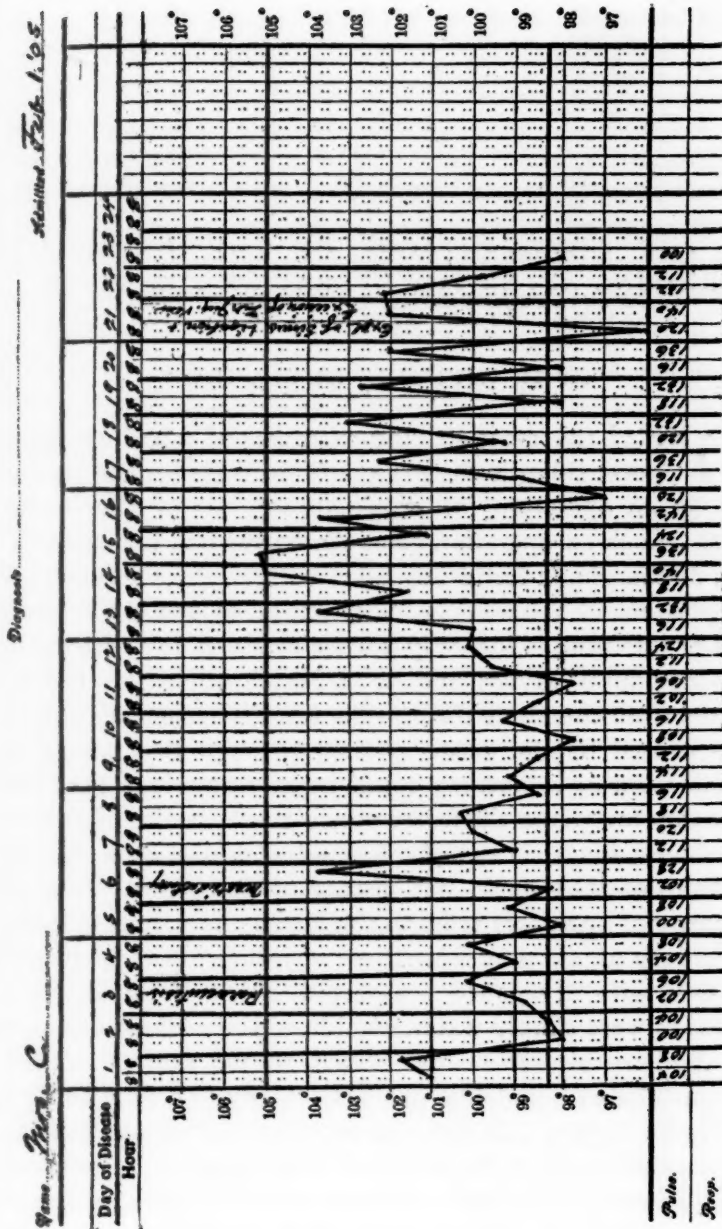
lowing day to 105° F. A diagnosis of involvement of the sinus was made, but owing to the extreme weakness of the patient, who had to be constantly stimulated, it was decided that it would be better to wait for a time before operating. The following day a consultation was held with a general surgeon, who said he thought the case was one of general pyæmia, and that he did not believe there was any involvement of the sinus. For the next five days all our efforts were directed to keeping up the patient's strength, the temperature ranging all the way from 104° F. to 97° F., as you will see by the temperature chart. On the sixth day, the patient being stronger, permission was granted to operate, and the sinus exposed from the bulb almost back to the torcular. The bone covering it was very dark, almost black in color. From the knee backward the dura was lustreless, and over a greater portion of its area white or yellowish. It was opened freely, and a clot removed from the knee which extended backward toward the torcular for about two inches. In the lower part of the vein there was a disintegrated clot with pus present. Upon finding this condition it was decided to expose, ligate, and resect the internal jugular vein, which was done. There were a number of enlarged glands along the course of the vein which were removed. After the removal of the vein, the lower end of the sinus was freed from the broken-down material which was present, and the wound in the neck closed by a continuous suture. She bore the operation very well, the only stimulation that was used being a hot saline thrown into the bowel during the latter half of the operation, and within half an hour after she was placed in bed.

The subsequent history was uneventful, as you will see from the chart, there being only one rise of temperature on the second day, and that was caused by a focus of pus in the neck, and on account of this two of the stitches were removed. The healing was rapid, and the resultant scar smaller than might have been expected from the suppuration that at one time threatened the soft tissues in this region.

The pathologist's findings in this case were that the clot in the vein, the walls of the vein, a portion of the sheath over the vein, and the glands removed, all contained large numbers of streptococci. It is interesting to note in this

case that there were no chills, no nausea or vomiting throughout the entire course and development of the disease. Only twice did the patient complain of a chilly sensation, and this would have passed unnoticed had not the family physician been present and asked why a blanket had been placed over the patient, and was told by the nurse that the window at the far end of the room, which had been opened, had remained so for about an hour, and at this time the patient said she felt as though she ought to have more covering, and later, when questioned upon this point, she said she had a little creepy sensation, as though she were going to feel cold, but no chill was present.

A word as to the first case reported. As subsequent events proved, it would have been much the safer and wiser procedure to have ligated and resected the vein at the time that the sinus was operated upon, but my reason for not doing so was that in a number of other cases, and particularly those in children, where a good return flow was present, the vein was not molested and the patients made good recoveries. It is a well-known fact, however, that even though the vein in the neck contains a thrombus, we may have very free hemorrhage at the bulb, when not even a drop of the fluid can be attributed as coming from the vein. Probably in the future I shall feel more like ligating the vein in every case of sinus involvement, provided the condition of the patient will admit of it at the time of operation.



ON THE DISADVANTAGES OF THE DRY-GAUZE
DRESSING AFTER THE OPERATION FOR SEPTIC
THROMBOSIS OF THE LATERAL SINUS.

BY H. GIFFORD, OMAHA, NEB.

ONE of the most striking examples of a bad use for a good thing is the dry-gauze dressing for the cavity left by an operation for septic thrombosis of the lateral sinus. Such an operation generally leaves one or two openings discharging a foetid pus laden with virulent germs from the portions of the sinus not fully exposed ; and as the inner wall of this tube is the only barrier between the germs and the intradural cavity, and as a large proportion of the deaths from the sinus thrombosis are the results of meningitis caused by the germs passing through this barrier, it would seem as if nothing could be more obvious than the necessity for giving the freest possible vent to the pus which continues, for a time, to be formed within the unexposed portions of the sinus. But instead of doing this, the great majority of operators seem to think that they are neglecting their duty unless they close these openings as thoroughly as possible with dry gauze, a material which, if the liquid in question were simply water, would certainly afford drainage by capillary attraction, but which, in the case of a thick albumen-laden liquid like pus, acts chiefly as a plug to keep it from escaping. In this respect the dry-gauze dressing for a septic cavity, the ends of which cannot be reached, always reminds me of the practice of the barber-surgeons of the last century, who plugged their wounds tightly with oakum and measured their achievement by the height to which the pus spurted when the plugs were removed. As an

example of what I mean, let me quote a report of Grunert from the clinic of Schwartz.¹ In the description of a desperate case of operated sinus thrombosis, the remarks on the operation close as follows: "Introduction of strips of iodoform gauze into both ends of the sinus; tamponade of the wound cavity." Then in the further notes of the course of the case: "29th of May, dressing changed, only the tampon from the lower sinus end removed; no hemorrhage; discolored foetid pus flows pulsating from the sinus. May 31st, at the change of dressing, a large amount of ichorous pus pulsates out of the lower sinus end. June 1st, at the change of dressing, ichorous pus again washed out of the sinus. June 4th, at the removal of the tampon from the upper sinus end, ichor still wells out."

And Alexander,² in describing a case in which he employed what I consider his otherwise excellent method of treating the peripheral end of the ligated jugular, says: "Into the vein a strip of gauze is pushed for about 3cm, etc. Change of dressing every other day at which the strip of gauze in the peripheral end of the vein appears soaked with pus, and upon withdrawing it some drops more of thick yellow non-foetid pus mixed with gas-bubbles welled forth from the vein."

These examples from the two most famous otological clinics of the world may, I think, be taken as fairly representative of modern practice on this point, but how any modern surgeon can believe that recovery from a septic phlebitis can be favored by plugging the end of the vessel with gauze, is more than I can understand. I suppose the practice originated with the idea that the gauze acts as a drain, which, as before mentioned, it does not. The most that any gauze does, when introduced through an opening into a suppurating cavity which it does not completely fill, is to prevent the opening from closing, so that when the dressing is changed it forms an easy guide to the original cavity and allows the latter to be cleansed of any pus which may have collected in the interim, and for this purpose it

¹ *Arch. für Ohrenheilkunde*, lix., p. 184.

² *Monatsschrift für Augenheilkunde*, Jan., 1904, p. 24.

does useful work, which is, however, done better in the great majority of cases by a drainage tube. But the walls of a thrombosed sinus are so thick and stiff that they themselves form drainage tubes of great efficiency if we simply avoid plugging them. But it is not enough to refrain from pushing gauze into the sinus-ends. Dry gauze, in my estimation, should not be used at all over that portion of the operation wound in which the ends of the sinus lie; for either the gauze is packed in so tight that it occludes the sinus-ends as thoroughly as if it were actually pushed into them; or the pus from the sinus spreads out between the gauze and the walls of the cavity so that the latter, which at the close of the operation is a very decent-looking place, is, when the dressing is removed, foul-smelling and foul-looking. I was led to seek a more rational form of dressing by a case in which the condition just described occurred. A young man with a chronic otorrhœa developed a sinus thrombosis, and on operating I found the vein filled with very foul-smelling pus. In completing the operation, quite an area of dura was exposed, and the wound was packed with iodoform gauze. On dressing it the next day, the discharge from the lower end of the sinus was found to have infected nearly all of the wound cavity. Under these conditions it seemed so absurd to continue the dry-gauze packing that I treated the wound almost as an open one—that is, I had it syringed out with peroxide and filled with boracic-acid powder and had the nurse repeat this procedure every two or three hours for the next two days. Beside which I myself two or three times a day injected several dropperfuls of peroxide solution into the lower end of the sinus. The walls of the cavity soon assumed a healthy aspect and the discharge from the sinus decreased so that after a few days the wound was packed loosely with iodoform gauze, which was then wet thoroughly with a sublimate solution 1:1000 and kept wet by covering the exterior with guttapercha tissue. This dressing was changed twice a day as long as there was any discharge from the sinus. The symptoms improved rapidly for a week or so, when an abscess of the right lung developed which had to be opened below the scapula, after which he

made an uninterrupted recovery. In another case of acute thrombosis of the sinus, the middle portion being found filled with pus, with no fœtor nor other complications, the temperature at once went almost to normal and stayed there under the wet-gauze dressing for two days after the operation, when I foolishly dusted in aristol freely before putting in the gauze, forgetful of the insoluble nature of this powder. The temperature promptly went to nearly 104° F., going down gradually under the simple moist dressing without the powder, so that the patient was practically well at the end of two weeks.

Cases of sinus thrombosis are not common enough in this vicinity to permit me to attempt anything like a statistical proof of the value of a moist dressing. I have used it in only five cases, in three of which the patient recovered. But it seems to me clear on general principles that a dressing of wet gauze, loosely packed into the cavity and kept wet by a guttapercha covering, will insure better drainage than dry gauze, to say nothing of the folly of plugging the sinus-ends. It may be asked, Why not put a drainage tube into one or both ends of the sinus? This I have considered, but the only object of such a tube would be to prevent the collapse of the sinus walls, which, in my experience, have always been so thickened as to allow no fear of this accident, and the introduction of a drainage tube would simply reduce the opening through which the pus must escape. It is, moreover, conceivable that the pressure of a drainage tube might favor necrosis of the inner wall of the sinus, with a spread of the infection to the meninges.

Whether packing the wound with boric-acid powder, as recommended particularly by Eemann,¹ may not be preferable to packing with gauze wet with sublimate solution, I am not prepared to say; my impression is that where the cavity can be cleaned more than once a day the boric powder is the better, but if the dressing is to be left twenty-four hours I believe the wet gauze gives better results.

Another point upon which I think great stress should be

¹ *Zeitschrift f. Ohrenheilk.*, xlv., p. 405.

laid is the importance of frequent dressing, as long as there is any question of pus still being produced in the lumen of the sinus. If the reader will revert to the citations previously made from Grunert and Alexander, he must, I think, admit that a patient under such conditions cannot have the same chance of recovery as he would if the dressing were changed from two to four times a day, and the sinus (and jugular vein if the latter is infected) thoroughly syringed out with peroxide of hydrogen. Such a plan, of course, involves additional trouble, but in these cases where the patient's life hangs in the balance we certainly ought not to neglect so obvious an advantage.

REPORT OF THE TRANSACTIONS OF THE SECTION
ON OTOTOLOGY OF THE NEW YORK
ACADEMY OF MEDICINE.

STATED MEETING MARCH 9, 1905. DR. GRUENING IN THE CHAIR.

Demonstration of charts for teaching otology to undergraduates. By F. WHITING, M.D.

Dr. GRUENING asked how these charts were drawn. They were certainly the work of an artist, but one must know all these things to bring the characteristic conditions so thoroughly before the eye. It was hardly possible for any one that was not an otologist to have such knowledge. He was inclined to think that Dr. Whiting had drawn them himself.

Dr. WHITING disclaimed this credit, but said that he had spent a great many hours by the side of the artist telling him what to draw. The man had no knowledge at all of the subject.

Dr. MCAULIFFE presented a young girl who had undergone a **double radical operation**. The ears showed degenerative changes, although the surgical indications had been met. The loss of hearing in so young a person was quite a serious matter. The girl had had five operations performed by different men, and up to November, 1904, the time when this history was taken, her hearing was fairly good. She then began to complain of tinnitus, which increased and diminished her hearing. The question now was, What could be done to improve her hearing and remove the tinnitus? She had suffered from this tinnitus since the radical operation was performed, and it is now becoming so great as to render her stupid and disturb her sleep.

The right ear first began to discharge at two years of age and was treated conservatively, up to the operation in 1903. After the operation there was no further discharge and the hearing was fairly good. It began to discharge again in February, and

she complained of fainting spells and dizziness. A second operation was done in February, and a third in April. Since then she has been free from the discharge until six weeks ago, when she began to feel as if her ear were packed with some foreign body, and her hearing decreased. The left ear also discharged pus and was operated upon first in September, 1903. This was not successful, and a second operation was undertaken shortly afterward. This operation proved successful, but the symptoms began at the same time as in the other ear—a feeling of fulness and increased pressure. The results of the operation were very interesting, since, owing to the permeability of the Eustachian orifice, a new drum cavity had been formed, as is usually the case. In the right ear he did not know what kind of meatal flap had been made; there was no skin graft. In the left ear he imagined that Dr. Whiting's graft had been made, since the cosmetic effect was the same and skin grafts were made. The question that remained was whether the increasing excess of contracting fibrous tissue was responsible for the tinnitus and loss of hearing. He thought that the case gave some color to the theory promulgated by Dr. Bates, who removed the fibrous tissue of O. M. C. C. ears in order to get as thin a septum as possible between internal ear and sound.

Is there anything in otology to relieve the girl? This is a very important question for her, as she has a promise of long life before her with the present prospect of an increasing aural disability.

Dr. GRUENING said that he heard for the first time of Dr. Whiting's flap and Dr. Bates's theory, and that probably the Section also would like to have some explanation of these references.

Dr. MCAULIFFE said that he thought that Dr. Whiting himself could give the best description of the flap devised by him.

Dr. WHITING said that he could honestly claim the distinction of having instituted a new flap, though he had never written the matter up for publication, and was not enough of a draughtsman to show how it was made, but was having a representation made by a draughtsman, which would show it accurately. He could only say that he transfixed the auricle in the vertical meridian above, passing around the posterior segment of the meatus with a semicircular sweep, which terminates in the vertical meridian below, but does not enter the concha at all. After the horizon-

tal incision was made, he made an incision of the vertical meridian below, and turned up exactly half of the fibro-cartilaginous meatus. This made an ample flap, and, so far as he was able to mould the flaps in the radical operation, he found it to cover a larger area of denuded bone, remain in position better, and was more easily handled. He did not feel that he could describe it more accurately than that.

Dr. GRUENING said that, although the description of the flap was very clear, he did not feel that he would be able to make it, and did not think he would ask for Dr. Bates's theory this time.

Dr. L. M. HURD: Report of a case of primary tuberculosis of the middle ear.

J. G., male, æt. seventeen months. When six and a half months old, the mother observed that the baby cried one night when laid upon the right side; she then noticed a swelling over the mastoid. The next day the baby was brought to the Manhattan Eye and Ear Hospital, where the mastoid was opened. This was the first week in August. The resulting wound failed to heal, and later the discharge became very offensive. The case came under my care the last of September, when dead bone could be felt at the bottom of the mastoid wound. I operated, and found the bone necrotic in every direction from the old bony wound leading into the antrum, also that a greater portion of the posterior-superior wall had necrosed away. The malleus, which was necrotic, was examined. The pathologist reported as follows: "Sections show marked absorption of the bone salts by osteoclasts, enlarging the Howship's lacunæ; also considerable activity of the osteoblasts. The granulation tissue is the seat of many areas of coagulation necrosis with epithelioid cells and giant cells. The giant cells are also to be found in the bony tissue, where the salts have been absorbed. Diagnosis: Tuberculosis of the malleus."

The mastoid remained open three months, and the granulations in the cavity showed a great tendency to bleed. February 3d, I removed some granulations from the roof of the cavity, and submitted them to the pathologist, who stated that it was typical tuberculous granulation tissue.

One month ago the left ear began to discharge, and now there are pale granulations in the middle ear similar in character to those in the other ear. Smears from both ears have been made several times with negative results.

The father is tubercular and is very fond of the baby, and probably has infected the case by kissing. The mother is in good health.

There is a history of the baby having had a slight cough, but I cannot find any evidences of tuberculosis in the lungs or elsewhere.

Dr. J. F. McKERNON: Exhibition of gland removed from surface of mastoid, simulating mastoiditis.

Dr. McKERNON said that the symptoms which presented themselves previous to the removal of this gland were somewhat similar from the standpoint of pain to those in mastoiditis. The patient, a young lady, was nineteen years old, and a year ago last month he had operated on the left side for acute mastoid involvement. The usual healing took place, and the girl left the city in September to attend school in Montreal. On the 9th of October she complained of severe pain on the opposite side, and they were afraid she had contracted trouble in the other mastoid, and sent her back to New York. On examination, he found that the canal and middle ear were in a practically normal state, there was no congestion of the drum membrane or canal, and no swelling back of the mastoid. On asking where the pain was, the girl put her finger on a spot midway between the tip and mastoid antrum. The tissue was a little softer there than at other portions, and pressure caused her exquisite pain, making her cry out. The other portion of the mastoid surface showed no disturbance. Thinking that it was probably a gland which might have become enlarged from a cold, or from an infection of the throat, the place was painted with iodine, and the girl told that it would probably diminish in size and give her little trouble. At that time there was a barely perceptible enlargement. The girl was kept under observation for ten days, and during that time the gland increased very little in size, but the patient complained of much pain, and could not rest night or day, so that the physician in attendance administered morphine hypodermically, in order to relieve her. The speaker saw her several times, and the physical signs in the middle ear were all normal, but finally, as a matter of expediency, he advised cutting down upon the gland and removing it, although he did not know then that it was a gland, as there was no outline, but simply an indefinite mass. The girl was put under chloroform, and after the soft tissues were incised this gland was reached. The specimen pre-

sented was only about one-third of the original mass, as a double cross-section had been made from it. The gland was embedded in the periosteum and overlapped the field corresponding to the antrum; incorporated in this gland, were the posterior auricular and the auricularis magnus nerves. The nerves were dissected from the gland and the latter removed, the incision was sutured, and the girl had no more pain. The pathologist reported that it was pure gland tissue.

The speaker said that he reported the case on account of its extreme rarity in simulating a certain form of mastoid trouble. None of the usual physical signs was present, but there were a somewhat enlarged mass and excruciating pain which made it necessary that something should be done to relieve the patient. There was no doubt of the suffering. The patient was carefully observed, and was not at all neurotic.

Dr. HASKIN presented a patient suffering from **deafness following meningitis**. This patient had come to the clinic with a history of deafness following an attack of meningitis two years before. This deafness existed in both ears. There was no history of otorrhœa, but there was marked destruction of both ear drums, a large opening into the attic of the left ear, and evident symptoms of inflammation in the middle ears. The child is four years old and absolutely deaf. They attribute the deafness to the attack of meningitis. The speaker said he did not know how to account for the condition, but that it looked like ignorance on the part of the parents in not noticing the discharge when it may have existed.

Dr. PHILLIPS said that he thought the case illustrated a class which is frequently seen in hospital and dispensary practice, where even the parents disclaimed all history of discharge, and yet examination of the ear would show that the drum was partially or wholly destroyed by previous suppurations—showing either forgetfulness or carelessness on the part of the parents. In the case presented by Dr. Haskins, there was a distinct history of cerebro-spinal meningitis, and there is no doubt that the child did have it, but the destruction of the membrane no doubt dates from some previous attack of suppuration and is not associated with the meningitis. As to these cases of deafness following meningitis, the speaker said that he had seen an unusually large number of such cases this season. He had never before seen so many—a few of them partially deaf, many entirely so. He

expected later to show a few cases where there had been a decided improvement following treatment. Most of them, however, were totally deaf and remained so. He also told of a case of a very intelligent child and attendant who had come to the Post-Graduate Clinic, giving a history of deafness following an attack of meningitis. The attendant said that the child had heard perfectly well for two months after the attack, and then became totally deaf.

Dr. BRANDEGEE presented a small **emergency pocket case** which he had devised, containing two curettes, aural specula, applicators, angular forceps, six knives with an adjustable common handle, and a metal pocket for cotton. The case and contents could be readily sterilized in a formalin stove.

Dr. J. E. SHEPPARD: **An obscure case of deafness.**

Miss M., æt. thirty-five, had what seemed like a mild influenza, during which there developed, on March 18, 1904 (Friday), a stuffy sensation and slight pain in A. D. By 4 A.M. on the morning of Saturday, March 19th, the pain was intense. She was then seen by Dr. Durkee, who reports to me that the membrana tympani at this time was only moderately inflamed, pinkish in color, this color remaining, with but little change, throughout the day. The pain was much relieved by frequent hot douching, so that it could be called moderate. During the day, no elevation of temperature, no perceptible deafness, no dizziness, no vomiting.

Sunday, March 20th, about 3 A.M., began, after a brief period of nausea, violent vomiting, and this continued, in spite of every effort at relief, for about twelve hours. At the time vomiting began, there was some elevation of temperature (to about 102° F.), and the pain in the ear was quite severe. About 7 A.M., while the Doctor was holding the patient's head, a few drops of fluid were felt trickling from the ear, and at this time the first deafness was noted. After twelve hours of this violent vomiting, there was great exhaustion of the patient, and the temperature was down to about 96°. Monday, March 21st: In the early part of the day, she had three "faint" attacks, lasting some minutes, distinguished by great pallor of face, unconsciousness, and extremely weak pulse. After these attacks, the patient commenced to complain of a distressing tinnitus in both ears, which, by the way, has never ceased from that time to the present. No further vomiting; slight dizziness (not much more than lightheadedness), followed by syncopal attacks.

For the first time she, this morning, complained of pain in the left ear, and both ears became deaf. (Deafness had been considerable in A. D. during Sunday, was much less early Monday, and became complete in both at the time of the "fainty" attacks.)

For the history up to this point I am indebted to my friend, Dr. Durkee, who was a friend of the family and who was in almost constant attendance upon the patient from the beginning of the illness. At this time, and especially because of the beginning involvement of the second ear, I was called in. Deafness to the watch, voice, and tuning-forks seemed complete. She complained of a very distressing, constant roaring in both ears. Considerable pain in A. S., none in A. D., which was discharging a moderate amount of sero-pus. In right *Mt*, a small (pin-hole) anterior-inferior perforation. Left *Mt* much reddened, posterior half moderately bulged. This was immediately incised. Scarcely appreciable tenderness at both mastoid apices. During the next three days (up to March 24th) there was free discharge from both ears, no further pain, deafness complete, tinnitus most distressing (not pulsating), dizziness not marked. Treatment had consisted of hot douching, gentle inflation, adrenalin spray, ice-bag for about twelve to eighteen hours to each mastoid, AgNO_3 sol. to vault; rest in bed, light diet. Began to-day with pilocarpin muriat gr. $\frac{1}{8}$ every three hours by mouth. March 25th: Mastoid tenderness gone; tinnitus possibly a little less. Seems to-day to hear by B. C. the C fork (128 d. v.), but not other forks, nor the voice. To-day I found a second pin-point perforation in right *Mt*, not far from the original opening. To continue hot douche, adrenalin spray, and pilocarpin. From March 29th to April 6th gave pilocarpin hypodermatically, getting marked constitutional symptoms from 8/60ths of a grain. Has been having two or three furuncles in the ext. aud. canals, which, on account of the severe pain, seem to have left her pretty well exhausted, so the pilocarpin was temporarily stopped. Seen by Dr. Gorham Bacon in consultation. April 8th: The two small anterior-inferior perforations in right *Mt* are closed, and there is now a small perforation in the posterior half of *Mt*. April 11th: To-day has the first relief from the succession of boils in both ears. She now hears by B. C. the C, C', and C'' forks, and possibly the C'' from the teeth. Having taken nux vomica in the meantime, on April 14th hypodermatic use of

pilocarpin was renewed. April 30th: Dose has been gradually increased up to $10\frac{1}{2}$ /60ths daily, the physiological effect being secured after each injection. Seems to hear the tuning-forks more distinctly, and through the conversation tube can hear a low-pitched voice sufficiently to indicate, after the speaker, rising and falling inflections, but cannot distinguish words. May 21st: Is now taking pilocarpin up to $11\frac{1}{2}$ /60ths. Perforations in *Mt* are entirely closed. Hearing no better. Has been taking, in addition to pilocarpin, the phosphate of strychnia $\frac{1}{120}$ gr., t. i. d. Seen by neurologist, Dr. Browning, who says there is no trouble outside of the ears. He recommended blisters over the mastoid bones, and, instead of strychnia, compound sol. of iodine internally, in five-drop doses, the pilocarpin to be continued as before, and to try mild X-ray and high-frequency current. May 26th: There being now but little reason to anticipate any further benefit from the pilocarpin, it was stopped, and the comp. sol. of iodine increased to six drops. June 13th: The appearance of the membranes and the use of the catheter show scarcely any remaining middle-ear trouble. Hearing unchanged. Is now taking eight drops of comp. sol. of iodine, t. i. d. June 28th: Is going away for the summer. Recommended that she take regularly K. I., commencing with gr. v., t. i. d., and each week to increase the individual dose one grain.

October 15th: Virtually no change in the local condition. Marked gain in general health. Hearing the same. Recommended that she take K. I. gr v., t. i. d., over a long period. Walking is not yet very steady, there being some staggering. This showed itself very much when she first began moving around after her original illness, and seems to have gradually improved. Tinnitus remained unchanged. I have not seen the patient since that date (October 15th), but I am told by members of the family that the deafness and tinnitus appear absolutely unchanged. Her gait is much improved. She has put on much flesh. Her habit as to eating has entirely changed, in that before her illness she was typically a small and dainty eater, whereas now she is almost a glutton—seeming to think much of the time only about what she is to have to eat, and having at all times an enormous appetite. I believe she has been latterly under the care of Dr. Weed, of New York, who expected to be present, but is detained at the last moment. He informs me that the recent treatment has consisted of inflation, and iodide

of potassium in large doses, 70 grains, t. i. d., but there seems to have been absolutely no improvement in hearing, nor lessening of tinnitus. Gait is now very good. In the early summer, I recommended as worthy of trial lumbar puncture, on the basis of Babinski's report, but, since I was without experience with the treatment, the patient and family were unwilling to make the experiment. I hope if any of the gentlemen present have had experience with this treatment, good or bad, that they will give us the benefit of it. What is the diagnosis? Frankly, I do not know what has happened. Even the nature of the middle-ear trouble is perhaps doubtful. In the presence of seemingly good drainage, why should a second, and finally a third, perforation have occurred in the right *Mt.* It seems as if tubercular and diphtheritic middle-ear disease can be positively excluded. As to the symptoms referable to the internal ear: Can they be hysterical? It seems to me, certainly not.

Is it possible to have a double neuritis acoustica? Alt has described a unilateral case, due to influenza, where on the second day of the disease occurred a facial paralysis, on the third day tinnitus, great dizziness, and deafness on the same side; eye-ground normal.

Would the symptoms be explainable by the supposition of a hemorrhage into the fourth ventricle? Sugar offers this as an explanation of a unilateral influenza case, with sudden deafness, great dizziness, and pain in temporal region, but inclines toward the belief that there was a hemorrhage into the labyrinth. A simultaneous bilateral labyrinthine hemorrhage is almost inconceivable. A suppurative labyrinthitis, in view of the subsequent course of this case, seems out of the question. A simultaneous bilateral serous effusion into the labyrinths seems to be more probable, but in that case why should treatment not have had more effect?

It was with the feeling that this offers the most plausible explanation that I suggested lumbar puncture, and I hope for a helpful expression of opinion on the subject from the gentlemen present.

Dr. MCKERNON inquired whether the middle-ear changes when first seen were confined to the attic. Dr. SHEPPARD replied that they were not.

Dr. WHITING inquired whether a culture had been made of the discharge from the ear, and on receiving a reply in the negative,

said that the case was an exceedingly interesting one, and that he regretted very much that no culture had been made, not that it would have thrown so much light on the nature of the inflammatory process, but it might have helped to an intelligent opinion. He had seen one case—perhaps two—which displayed many of the manifestations described in this one. One of these cases was what he had been accustomed to call a double apoplexy of the labyrinth—a double Ménière's disease. This displayed certain of the manifestations described, but others were absent. This man claimed that he had never had any trouble with his ear in his life, but one day while walking in Central Park he was suddenly seized with vertigo and a tremendous roaring in his ears. He fell over in the walk in a semi-stuporous condition, but did not entirely lose consciousness. He still knew where he was, but everything seemed to whirl around him. He was taken up in an ambulance and carried to a hospital where he remained for three weeks. During that time the vertigo slightly diminished, but he said that for a week he could not open his eyes for the vertigo was so terrific that it induced vomiting. It was two weeks before he could get out of bed, and five or six weeks before he could walk with any steadiness. The speaker had seen him two or three months after the attack, and co-ordination was then fairly re-established, but he could not stand very well on two feet, and with one foot raised could not stand at all. While this case lacked many of the features mentioned by Dr. Sheppard, it seemed to be sufficiently analogous to be mentioned in connection with it. He had always regarded it as a case of double apoplexy of the labyrinth. In Dr. Sheppard's case there must have been a serous effusion on both sides.

Dr. LEDERMAN inquired whether the vomiting was of a projectile nature.

Dr. SHEPPARD replied that he did not see the vomiting, but from the description given it could not have been typically projectile. His own opinion, however, had always been that it was a cerebral vomiting.

Dr. LEDERMAN told of a case which, while traumatic in origin, presented some interesting symptoms in this connection. In this instance after an incision had been made into a drum acutely inflamed, projectile vomiting set in, which was attributed to striking the posterior wall of the middle ear at the time of the incision. Nausea kept up for two or three days and the man could

not get on his feet for two or three days, on account of vertigo which accompanied the attack. The vertigo lasted for a week. During these symptoms the hearing was much lowered but gradually returned. The patient had to remain in bed to avoid bringing on the attack of vomiting. As these symptoms had not existed previous to the surgical treatment, there was evidently a destruction of the labyrinthine equilibrium due to this treatment. The vomiting was typically projectile, extending as far as two feet.

Dr. GRUENING referred to the fact that Dr. Sheppard had asked if any of the gentlemen had ever had any experience with lumbar puncture in similar cases, and then told of a little boy upon whom he had operated for abscess of the temporo-sphenoidal lobe. The abscess closed and the boy recovered. Four years later the boy suddenly began to vomit, and from this ear serous fluid began to flow in large quantities. Examination showed that the lower surface of the brain from which this fluid came had opened, but there was no granulation tissue. A gauze drain was put into the ear, and the ear was kept sterile. The boy became very ill, however, and finally lumbar puncture was made and a one-per-cent. solution of lysol was injected, and the boy recovered. There was no discharge of serum after the puncture. Two punctures were made, and more than thirty cubic centimetres of fluid were drawn off. This case was reported by Dr. Manges. In this case there was a superabundance of cerebrospinal fluid which absolutely came through the ear, and the patient was benefited by the puncture.

Dr. LEDERMAN asked whether the hearing was improved by the lumbar puncture.

Dr. GRUENING replied that the hearing had been destroyed. The ossicles had been removed and the abscess had been opened after the removal of the antral roof and the tegmen tympani, so that there was practically no hearing.

Dr. H. A. ALDERTON: A few remarks on the proper cleansing of a running ear.

Dr. ALDERTON emphasized the importance of greater personal supervision on the part of the attending surgeon; also the need of rendering the external ear perfectly aseptic before doing a paracentesis of the drum membrane. He recommended that an attempt be made in all appropriate cases, after the paracentesis, to install the dry method of treatment by means of frequent use

of the gauze drain and outside dressings, with the hope of shortening the course of the disease. Should this prove inefficient after a trial of forty-eight hours, he recommended syringing every two hours with a warm antiseptic solution, by means of a soft-rubber constant-flow syringe. There exist then but three indications: first, the removal of the accumulating discharge from the ear canal; second, the rendering of the canal as little septic as possible; third, the administration of systemic remedies with a view to modifying the intensity of the middle-ear inflammation. The necessity of thorough drying of the external ear after each douching, was insisted on. He cautioned against the use of peroxide of hydrogen in acute cases. He then took up the methods of cleansing an ear the seat of a chronic abscess, emphasizing the necessity for providing good drainage of the tympanum by enlarging the perforation down to the floor.

He emphasized the disadvantages of keeping up the moist treatment too long; as syringing has the well-known disadvantage of encouraging an œdematous condition of the mucous membrane, the development of granulation tissue, an osmotic flow from the blood-vessels, and an increase in the secretion from the glandular apparatus.

Dr. GRUENING said that there were a number of interesting points brought out in this paper, and that he certainly agreed with Dr. Alderton that the dry method of treatment was to be preferred, but that in some instances it was impracticable. It was often impossible for the surgeon to be in sufficiently close attendance. The nurse could not carry the gauze to the drum, and very often the general physician could not do it. He had treated a number of patients in his office where a daily introduction of gauze proved sufficient, and very often in three or four days the patients were cured. In general it was rather difficult to introduce the middle-ear syringe and wash out the ear of a child, and then carry the gauze to the drum. These manipulations are difficult in the child. He believed, however, in the dry treatment, and the plan of drainage was sound and very satisfactory.

Dr. ALDERTON said that much of the result depended upon the attending surgeon himself, but that if a competent nurse were provided with the proper material and carefully instructed how to follow up the treatment, it could be as thoroughly carried out in a private family as by the surgeon himself.

Dr. C. G. COAKLEY: Condensed report of a case of streptococcic otitis media, followed by mastoiditis. Operation. General septicæmia. Death.

Dr. WHITING said that the question of the path of infection was an exceedingly interesting one. The writer had spoken of the wounding of the emissary vein, and of the possibility of the infection of the sinus in that way. He himself had been so unfortunate as to do this in an operation some time ago and had a sinus thrombosis. In this case, however, the patient fortunately recovered; but the subsequent exploration (of Dr. Coakley's case) showed no sinus trouble, and therefore the path of the infection is almost confined to lymphatic absorption, and the fact that no large lymph nodes were found should not invalidate the proposition. Where you cannot trace a path through the inner table of the skull, and no sinus thrombosis is present, it seems a fair proposition that it is lymphatic absorption.

Dr. ARNOLD KNAPP said that the possibility of infection through the jugular bulb should be considered. The condition of the sinus found at operation did not exclude a parietal thrombosis of the jugular bulb. After operation, discharge from the auditory canal continued for some time, and in the light of other cases, where no change in the lateral sinus was found to account for the septicæmia, it seems feasible to assume a direct infection of the jugular bulb which was not followed by an obturating thrombus.

Dr LEWIS said that the case was an extremely interesting one. In a review of the case the only criticism that he would make was that, in view of the fact that the infection was due to the streptococcus, he regretted that he had not supported Dr. Coakley in his inclination to open the mastoid cells three days earlier than was done. Dr. Lewis was not present at the operation, but saw the case some forty-eight hours later. The mastoid operation had been most thoroughly performed, the wound was clean, and the external auditory canal dry; the discharge from the middle ear, which Dr. Coakley stated had been profuse for a few days, had ceased.

They were positive that an unrecognized complication was present; but where? A high temperature and an increase in the pulse and respiration did not give any clue in the absence of localizing symptoms. Naturally the brain, the sigmoid sinus, and the jugular vein were considered the most probable seats of

a further infection, but only because the ear was the organ primarily infected, for there were absolutely no local symptoms present to cause this suspicion. The sinus was opened later, purely as an explorative procedure, and, as far as the unaided eye could detect, no infection was present.

A microscopical examination of an exsected jugular vein would have been necessary to determine the question of whether or not this was the path of infection. Dr. Lewis seriously questions if they had any justification, under the circumstances, to take such a radical step.

MEETING OF APRIL 13, 1905. DR. EMIL GRUENING, CHAIRMAN.

Dr. PERCY FRIDENBERG presented a young woman with a **bilateral deformed auricle**. The upper part of the cartilaginous auricle was invaginated under a fold of skin.

Dr. GRUENING presented a patient upon whom he had **successfully operated for a brain abscess** in the temporo-sphenoidal lobe. The patient, a man twenty-seven years of age, was seen on December 21, 1904, suffering from chronic otorrhœa and cholesteatoma. He complained of headache. T. 101°; P. 60. No paralyses; no optic neuritis, and no other symptoms except optic aphasia. On showing him a watch and a key he perfectly well understood their use but was unable to mention their names. The operation was performed on the same day and the tegmen of the tympanum and the antrum were found defective. The dura bulged and was discolored. The exposure was enlarged into the region of healthy dura; the temporal ridge and part of the squama were removed. An incision through the dura revealed normal brain tissue. At a depth of 2cm a large amount of fetid pus was evacuated. The incision was separated and the discharge allowed to escape. The cavity was irrigated. Iodoform gauze was gently introduced. During the next five days there was considerable discharge found in the gauze and about the dressings, then the wound became dry. The brain in this area prolapsed; it subsequently organized, and became firm and retracted. The aphasia existed for three weeks. At present the wound has entirely healed. The hernia is not visible as it took place into the mastoid wound. Since 1901, Dr. Gruening has operated on four abscesses in the brain successfully. He has followed this method in all cases.

Discussion.—Dr. MCKERNON agrees with the speaker that drainage was the important factor in the treatment of these cases, and, whenever it is possible, to treat the abscess cavity from its lowest point. The after-treatment was thus very much simplified.

Dr. EAGLETON inquired how the prolapsed brain was treated.

Dr. GRUENING replied that the prolapse was not treated at all, it apparently took care of itself. He was in favor, whenever possible, of attacking the brain abscess from its lowest part. He had attempted to make use of Dr. Whiting's encephaloscope but without success.

Dr. G. B. MCAULIFFE presented a patient with **ossification of the auricles**. The patient had been in a psychopathic institution ten years ago and his ears had been injured a number of times. In attempting to correct the resulting deformity, the Doctor was enabled to confirm the bony nature of the auricle, which had been apparent on palpation.

He also reported on a case of **external cerebrotomy** in a patient who suffered from caries of the attic and antrum and presented some labyrinthine symptoms. An investigation of the brain proved negative and the patient recovered.

Report of two cases of mastoidectomy, sinus thrombosis, ligation and resection of jugular vein. Recovery. By Dr. J. F. MCKERNON (published in full, pp. 298-303).

Discussion.—Dr. HARRIS: As regards the question of closing the neck wound after resection of the jugular vein, he had recently observed a case in which the neck wound had been closed. An abscess developed, which extended downwards and led to an abscess of the mediastinum which terminated fatally.

Dr. ARNOLD KNAPP thought that the second case was unusually instructive, as showing that general opinions on septicæmia do not hold in all cases of mastoid infection. It is now assumed that sepsis from an otitic condition is always due to a sinus involvement. All cases have not such a fortunate termination as the second one which Dr. McKernon reported, if the operation is delayed.

Report of a case of mastoiditis complicated by pneumonia, gangrene of the lung, endo- and peri-carditis, without apparent involvement of the lateral sinus. By S. McCULLAGH, M.D.

Child, age five, had acute mastoiditis supervening on chronic

suppurative otitis media. Operation showed mastoid to be full of pus, cholesteatomatous material, and granulation tissue, with sinus and dura exposed. Four sequestra were also removed. Patient reacted well from the operation. Five days later, pneumonia developed in left lung with signs of pleurisy in the right. Two days later, pericarditis developed and endocarditis was suspected. Four days later, the patient died.

Autopsy showed lobular pneumonia, left lung. Right pleural cavity full of offensive fluid, with the lower portion of right lung collapsed and gangrenous. Pericardium distended by seropurulent fluid and surface covered with fibrinous deposit. Beginning involvement of endocardium. Lateral sinus contained no thrombus. Jugular bulb not examined. No bacteriological examination.

Preliminary report of a case presenting Ménière's symptoms for five years. Result to date of operation of ossiclectomy. By P. D. KERRISON, M.D.

Report of a case of an unusually thin lamella of bone separating the sigmoid sinus from the meatus. Successful radical operation. By W. SOHIER BRYANT, M.D.

The dangers of attempting to curette the jugular bulb prior to ligation of the jugular vein in operations upon the sigmoid sinus. By J. D. RICHARDS, M.D. (To be published in next number of these ARCHIVES.)

Discussion.—Dr. McKERNON agreed entirely with what Dr. Richards had said about the impossibility of curetting the jugular bulb. If the terms are used as such, it simply means that they are too free and that it is impossible to curette the bulb. He also agreed with Dr. Richards on the importance of removing the walls of the vein as well as the contents. He does not always ligate the jugular vein, especially in children, where the clot in the sinus was solid and apparently recent and the patient's condition was good. A large proportion of the cases unquestionably get well without the ligation of the jugular vein.

Dr. GRUENING thought it was sometimes possible to extract a thrombus from below, where it was not necessary to ligate the jugular vein. At the same time hemorrhage from the bulb does not mean an involvement of the jugular vein, because only recently he had, after ligating the jugular vein, met with profuse hemorrhage from the bulb, which evidently came from the inferior petrosal sinus.

REPORT OF THE TRANSACTIONS OF THE
SEVENTH INTERNATIONAL OTOLOGICAL
CONGRESS IN BORDEAUX, AUGUST 1 TO 4,
1904.

By DR. DREYFUSS, STRASSBURG.

Translated by Dr. ARNOLD KNAPP.

Two hundred aurists took part in the Congress. Of these, the majority, of course, were French; England and the United States came next; Germany was represented by five members, Austria by only two, and Switzerland by none.

In the late afternoon and evening of each day excursions and banquets were planned in a most hospitable manner.

The scientific part had been admirably arranged by the Secretary, Dr. Lermoyez. It is, however, becoming well recognized that the value of international congresses in furthering science is a very small one. In the author's estimation, this is due to the two following factors: first, the difference of languages spoken at a congress; and, secondly, the enormous quantity of papers. In addition to three long addresses, 119 papers were announced.

1. POLITZER (Vienna). **On the necessity of official instruction in otology in the medical faculties.**

A short resumé of the present conditions of instruction in the various countries. The author draws attention to the imperfection of the state examinations, and suggests a remedy in the interest of suffering humanity.

2. GRADENIGO (Turin). **On the necessity of the obligatory study of otology at the universities.**

After giving the general reasons, Gradenigo states the necessity of an obligatory examination in otology. He suggests the formation of an international commission, whose duty it shall be to introduce the subject to the various governments. The commission is selected.

3. YEARSLEY (London). **On the constancy and variation of the suprameatal spine.**

One thousand and seventeen skulls of various races were examined. In 155 cases no spine was present. More frequently its presence was scarcely suggested. In every case the practised eye detected the depression above the spine, and in the author's opinion this depression is of a great deal more practical importance than the spine.

4. BROECKAERT (Ghent). **On the injection of cold paraffin.**

*Demonstration of a new syringe.

5. TRÉTRÔP (Antwerp). **The practical use of bacteriology in diseases of the throat, nose, and ear.**

The author describes his antiseptic and aseptic practices.

6. DREYFUSS (Strassburg). **On the influence of quinine on the tonus labyrinth.**

(To appear as an original article in these ARCHIVES.)

7. JOERGEN MOELLER (Copenhagen). **Remarks on otosclerosis.**

A case with clinical and autopsy reports. The formation of spongy bone tissue in the labyrinth wall. On the right side, true ankylosis of the stapedial joint. On the left, however, preservation of the annular ligament.

8. SARGENT F. SNOW (Syracuse, N. Y.). **Catarrhal deafness; report on 400 cases.**

9. THEODORE HEIMANN (Warsaw). **Indications for operating on the mastoid process in acute otitis media.**

The mastoid process should be opened under the following conditions: when the suppuration continues after three to five weeks; when pain continues in the mastoid process and its neighborhood after three to four weeks, even though the otoscopic picture reveals no sign of retention; if the fever continues over three weeks. Swelling of the cutaneous covering of the mastoid process in the first days of the disease does not of itself indicate operation. Swellings occurring in the subsequent course are of more importance. Signs of general meningitis are not an absolute contra-indication.

10. DENCH (New York). **The radical operation in chronic purulent otitis.**

(Published in full in the preceding volume of these ARCHIVES.)

11. CASTEX (Paris). **Injuries of the ear from accidents.**

Report of 78 personally observed cases.

12. MOURET (Montpellier). **New investigations on the petrous cells.**

This is a continuation of the investigations published in October, 1903, in the *Société Française de Laryng.*

He found that pneumatic cavities extended from the tympanum as a central point in the direction of the petrous pyramid and occipital bone, which he was able to divide into eight groups. Of these, the following are of practical importance: the cells situated in the upper meatal wall, those situated at the lower surface of the labyrinth, and those which extend into the occiput.

13. JACQUES (Nancy). **Aural suppuration, with perforation into the retromaxillary fossa.**

14. JACQUES and DURAND (Nancy). **Demonstration of normal and pathological specimens.**

These specimens were preserved in Kayserling's fluid, and mounted in celluloid.

15. VILLAR (Bordeaux). **Technique of nerve suture of the facial with the accessory or hypoglossal nerves in cases of facial paralysis.**

The author has performed suture of the facial and accessory nerves in one case.

16. MOLINIÉ (Marseille). **Defect of the lips of the Eustachian tube and atresia of the pharyngeal tubal ostium.**

Molinié has observed two cases. In both, the naso-pharyngeal isthmus was contracted. Both cases are, according to the author, presumably the results of too energetic galvano-caustic procedures.

17. G. LAURENS (Paris). **Aural surgery in its relation to the vertebral column and the base of the skull.**

The author has operated upon thirteen cases of vertebral or hypocranial otitic suppuration.

From a clinical and operative standpoint, the base of the skull is divided into three territories: (1) the posterior or occipital, (2) middle, corresponding to the lower surface of the petrous bone, and (3) anterior or lateral præ- or latero-vertebral.

Infection of these parts is probably due to direct contact, and, more rarely, by means of the blood or lymph-channels. As regards operation, the most important step is the total resection of the mastoid process. After this has been accomplished, three areas must be carefully investigated because suppuration may

extend from them: (1) the groove of insertion of the digastric muscle; (2) an area which is limited anteriorly by the posterior meatal wall, posteriorly by the S-formed sulcus and the lateral sinus, below by the mastoid apex, and above by the antrum; (3) the lateral sinus and the cerebellar dura. The remainder of the operation depends upon the conditions found present.

18. The selection of a simple and practical acoumetric formula. By POLITZER, GRADENIGO, and DELSAUX.

The formula recommended by the authors for measuring hearing and its notation is adapted for use in ordinary practice. If a more detailed examination be necessary, other methods should be selected according to the judgment of the examiner.

The address is divided into three chapters:

I. The various methods of examination of the normal and diseased ear are described.

II. An attempt is made to determine the most suitable method of examination for ordinary practice.

III. A scheme is suggested by which the results of the examination can be tabulated.

I. The Examination of the Hearing in the Normal and Diseased Ear.

The various methods which are employed at the present time to determine the acuity of the hearing have caused within the last years a number of valuable papers to be written by physiologists as well as by aural surgeons. The various tones which make up the human voice were noted and analyzed on the basis of modern physics. The laws were determined which govern the vibrations of tuning-forks, and definite relations could be proven between the hearing for the human voice and for certain tuning-forks. Nevertheless a number of defects still exist in this part of science, and unfortunately the views of the authors who are active in this department still diverge.

As regards the voice, the phonograph has shown that the objective determination of the pitch has replaced the old subjective method, because it furnishes more exact data. This method of determination of the constant elements of the voice is still imperfect, because we have found definite results only in the case of the vowels and not for the consonants. The pitch of the vowels varies under certain conditions. This depends especially upon the difference in the various languages and in the numerous dialects. The pitch also varies according to the preceding or

subsequent consonant. The rhythm of the voice is also of importance.

As regards the hearing distance, viz., the maximum distance at which the various tones of our voices can still be perceived, it has been shown that the pitch of the tones does not depend directly upon the rapidity with which the tones are produced. Of much greater importance are the physical conditions of the room in which the hearing tests are made, viz., the degree of freedom from noises, and especially the capability of the person examined to guess vowels and consonants which he does not correctly understand. Furthermore, at present the proportional relation of the tones of the voice to one another, when they are pronounced in a whisper or in the ordinary voice, is still unknown.

The same difficulties are present for the acoumeter or the watch. For the first, Gradenigo has computed a frequency of 400-468 double vibrations. There are instruments which produce tones of distinctly constant intensity and can be used for hearing tests. Though the pitch of these tones can be determined, it is much more difficult to estimate their intensity. Typical for these instruments is the tuning-fork. This instrument has the advantage of moderate cost. It can be produced of pure tone, free from overtones. Unfortunately the authors' opinions differ on one very important point, in what relation the intensity of the tones of a tuning-fork diminishes as the force dies out. Bezold and Edelmann have one opinion, Schmiegelow stands for the opposite side. Again, Gradenigo, basing his opinion on photographic impressions, suggests a different theory. Quix and Struycken, again, differ from these authors; and finally there is Ostmann, who has published a new method of objective acoumetry.

Different opinions are also held on the relation between the amplitude of the vibrations and the intensity of the tuning-fork tones. Some believe in a simple proportion, others in a quadratic relation. Again, others believe in a formula $i = a^{1.2}$ (i = intensity; a = amplitude).

The relative intensity of a tuning-fork in the various phases of its vibrations is also different. Opinions do not agree on determining the diminution of intensity of a tone on approaching or removing the tuning-fork from the ear. Finally, there are many points of difference of opinion in regard to the physiology of the

middle and internal ear, especially concerning bone-conduction—so that the entire value of an examination with the tuning-fork is uncertain. The more we study the examination of the hearing, the clearer it becomes how extremely complicated are the conditions, and how careful we consequently must be in deducting from the results obtained.

II. Simple and Suitable Methods of Hearing Examination for Ordinary Practice.

Owing to imperfections in our instruments for determining the hearing, it seems right to divide the functional examination into: (a) quantitative examination, or determination of hearing acuity, and (b) qualitative, or determination of the hearing defects for certain tones or segments of a scale. As we have seen above, the ordinary instruments do not give the pure tones free from overtones. On the other hand, unfortunately the tuning-forks, which do not suffer from this defect, cannot be employed to determine hearing acuity. At this point it would be desirable if we could give in figures the clang-tint of our instruments for examination.

With Quix the tones can be divided into three categories:

1. The *zona gravis*, including tones from *ut* to *ut*²; they are heard up to a distance of 6 metres.
2. The *zona mixta*, from *ut* to *fis*⁴; heard by the normal ear from a distance of 14–16 metres.
3. The *zona acuta*, from *ut*³ to *fis*⁴; audible up to 30 metres.

The hearing examination for the whisper not only gives us quantitative results, but under certain conditions furnishes a clue as to the qualitative hearing.

Practically we may perform the measure of hearing with fundamental and supplementary methods of examination.

Among the fundamental are counted:

1. Examination with the whisper and conversational voice.
2. Examination with the acoumeter of Politzer and the watch.
3. Examination with the tuning-fork (Schwabach, Weber, and Rinne experiments), and finally the determination of the field of hearing according to Zwaardemaker.

The supplementary methods include:

4. Examination with the continuous-tone series of Bezold.
5. Determination of the hearing field according to Hartmann and Gradenigo, supplemented by the determination of the high- and low-hearing limits.

6. Corradi's experiment.

7. Gellé's experiment.

8. Determination of the patency of the tube according to Politzer.

8. Electric reaction of the auditory nerve.

1. Examination with the voice: The three categories of Quix are reduced practically for the whisper to two, the *zona gravis* and the *zona acuta*. It is necessary to determine for every living language certain typical words, though in the hearing examination, in order to avoid the possibility of guessing, other words must be used in between. The conversational voice is suited for examination only in certain cases (as we cannot exclude the other ear), when both ears hear equally well, or when the other ear is very deaf.

2. Examination with Politzer's hearing measure and the watch: Notwithstanding its defects, the watch is a most convenient and, for determining the bone-conduction, a very excellent method of investigation. Politzer's instrument has a certain value in disturbances of hearing of medium or pronounced intensity. The author recommends, however, that the sound should be produced in a little different manner than is customary. Instead of using the thumb, the instrument should be moved like a bell, and the blows of the hammer should take place with more uniform intensity.

3. Examination with the tuning-fork: Owing to the great differences of opinion in relation to the intensity of sound and duration of vibrations, it seems proper to only study the duration of vibrations of the tuning-fork in their relation to the hearing threshold. As has been previously mentioned, the duration of perception of a vibrating tuning-fork and the relative intensity of the sound are not in a simple relation.

Schwabach's and Weber's experiments should be performed with forks of 128 D. V. They should be continued notwithstanding the various ways in which the results have been interpreted. Rinne's experiment should be tried with a fork of 64 D. V. It is surely much simpler than the methods advocated by Corradi and by Bonnier.

It is desirable to more clearly define the term "hearing field" (*champ auditif*). This term may include the area of the scale which is perceived by the ear—similar to the expression, "visual field,"—points in space up to which the ear perceives

certain tones. The term "hearing field" should be applied only to the first; for the second, the authors recommend the term "hearing horizon."

For the hearing-field determination, Zwaardemaker suggests four principal zones: (1) the contra-octaves; (2) the highest register of the singing voice; (3) the vowels; (4) the high consonants. To these correspond: (1) the lowest-tone limit up to 64 D. V.; (2) from 64 to 256; (3) from 256 to 2880 (Zwaardemaker), or, as the reviewer suggests, to 3072; (4) the tones situated above this limit. The *ut*² and *sol*⁴ forks should be provided with a larger hammer in order to have all the same intensity.

The forks of Weissbach are more convenient than those of Bezold-Edelmann in determining the hearing field. To determine the lower-hearing limit, *G*₂, *C*₁, and *G*₁ forks (24, 32, and 48 D. V.) are recommended. The tuning-fork of 16 vibrations can scarcely be made use of in practice. To determine the upper-hearing limit, the Galton-Edelmann whistle cannot be recommended on account of its excessive price and defects. The rods of Koenig are preferable, and cylinders *ut*⁶, *mi*⁶, and *sol*⁶ are recommended.

The authors believe that the entire outlay for instruments for the determination of hearing should be about one hundred francs.

III. The Hearing Scheme.

To register the important findings, the scheme is suggested which Gradenigo demonstrated before the London Congress. Latin words are used. The names of the authors are designated by the beginning consonants:

S
A.D
W R. H. Hm. Ht. P. v. V
AS
AD
L. i. ut. ut². sol⁴. L. s
A.S.

AD = right ear; AS = left ear.

S = Schwabach's experiment. If it results normally we put after the S \pm , for longer than normal +, for shorter -; it is, however, necessary that there should be a discrepancy of at least three seconds from the normal.

W = Weber's experiment; an arrow directed either towards the right or the left ear denotes lateralization; if the arrow be absent, the experiment was negative.

R = Rinne's experiment (fork of 64 vibrations); if a higher fork be employed, this must be specially noted. The results are recorded according to the method of Bezold.

H = watch. The distance at which it is heard by the ear is expressed decimally. If it is heard only near the ear, by the word "prope"; if only on contact, "concha"; if not at all, "o."

Ht = watch heard at the temple or at the preauricular region; if it is heard in this region = +, if not = o.

Hm = watch on mastoid process.

P = Politzer's hearing measure, distance in metres.

v = whisper given with the residual air; distance in metres; if below one metre the number is approximated within 5cm, if over one metre within 25-50cm; a line separates the results of the examination with the tones of the zona gravis and the acuta; for instance, 1-6 denotes 1-metre whisper tones of the zona gravis to 6-metre whisper tones of the zona acuta.

If the whisper is heard only near the ear, "prope"; if it is perceived but not understood = ∞ ; if not heard at all = o.

V = conversational voice.

L. i. = Lower-tone limit. The hearing duration is expressed in one-hundredths of the normal.

L. s. = upper tone limit. Koenig's rod, which is still perceived, is noted.

There are still so many points in this important question which are obscure that we suggest the formation of a permanent international commission for the measurement of hearing, which shall meet once a year and report to each Otological Congress.

19. **QUIX (Utrecht). The determination of the hearing distance for whisper and tuning-forks.**

The author suggests dividing the whisper tones according to their constituent elements. It is also necessary to examine the tones for their intensity.

20. **PANSE (Dresden). A new method of diminishing sound-intensity and of examining the ear objectively.**

An apparatus is shown, consisting of the following parts: an ear-piece, which fits tightly into the meatus; a connecting tube of about 1m in length; and a sound receiver, closed with a disk.

The disk has a number of openings of various sizes, in front of which a vibrating, deep tuning-fork is placed. The perceived intensity of sound depends upon the size of the opening in the disk.

21. TRÉTRÔP (Antwerp). An attempt to measure the hearing in metres.

22. BONNIER (Paris). The measure of hearing and international tuning-forks.

A uniform scheme is suggested, a tuning-fork of one hundred vibrations, which is to be heard from the handle.

23. DELIE (Ypres). Tobacco and hearing.

The author warns against the abuse of nicotine, especially in individuals who already are suffering from sclerosing ear affections. Twelve cases were observed.

24. LANNOIS (Lyon). Disturbances of hearing in herpes zoster.

Herpes of the face and of the neck can, as is well known, be associated with facial paralysis, and in some of these cases there were also disturbances of hearing, such as hyperacusis, deafness, tinnitus, and vertigo.

The associated facial paralysis prevented an exact determination of the symptoms on the part of the ear, because in peripheric facial paralysis, owing to an involvement of the middle-ear muscles, all the symptoms may be the result of the paralysis of these muscles. Two cases are reported with disturbances of hearing, which were not accompanied by facial paralysis. He therefore regards the condition as a direct manifestation of the herpes of the face in infectious diseases of the auditory nerve.

25. ESCAT (Toulouse). On aural migraine.

There is an aural migraine, consisting in attacks of deafness, tinnitus, and aural pain. Most of the individuals suffered from hereditary otosclerosis, with early involvement of the labyrinth.

26. BOULAY and MARC-HADOUR (Paris). The psychical element in cases of deafness.

There are some patients who consider themselves deafer than they really are, and consequently do not take the trouble to hear. These can be considerably improved by the psychic influence of the physician and other appropriate treatment.

27. BOURGEOIS (Paris). On the diagnosis of bulbar disturbances of equilibrium.

A woman, forty-seven years of age, was suddenly taken ill

with severe right-sided headache, without loss of consciousness, severe vertigo, tendency to fall to the right, and right-sided myosis. When quiet, there was a slight horizontal nystagmus; on exposure to light, distinct rotatory nystagmus. Rarefaction of air in the right canal produced severe vertigo and nystagmus. There was, in addition, right-sided muscular weakness.

The autopsy revealed a syphilitic area of softening in the medulla oblongata, on the right side, beginning in the lower half of the olive, of the lateral tracts of the nucleus ambiguus, the descending trigeminal root, and the direct cerebellar tract.

The auditory tracts, especially Deiters's nucleus, were intact.

28. ROZIER (Pau). **The diagnosis of syphilis by the aurist.**

29. BRIEGER, VON STEIN, and DUNDAS GRANT. **The diagnosis and treatment of labyrinth suppurations.**

BRIEGER (Breslau). **Labyrinth suppurations.**

The labyrinth may be involved in every form of acute and chronic middle-ear suppuration. The process in the labyrinth usually follows the type of primary disease in the middle ear (simultaneous inflammation in the labyrinth in scarlet-fever suppuration, involvement in the formation of cholesteatoma). In tuberculosis of the middle ear the specific process does not always extend to the labyrinth, but a mixed infection is apt to invade the labyrinth through an opening made by the tuberculous process.

The entrance for the infectious agent in labyrinth suppuration is usually through an artificial route of communication from the middle ear. This communication may be the result of a traumatism. Lesions of the window-membranes transmit infections to the labyrinth more frequently than injuries to the semicircular canal.

Middle-ear suppurations usually extend by way of the oval window or by the horizontal semicircular canal to the vestibule.

The promontory is usually only affected in cholesteatoma and tuberculosis, where a clinically apparent communication between the middle ear and the cochlea exists. However, in certain acute suppurations, the inflammation may extend within the bone, which can only be recognized by the microscope.

There are pure labyrinth symptoms, which depend upon the particular part of the labyrinth affected, and must be distinguished from the symptoms which are induced by an involvement

of the neighborhood, as, for instance, the conditions occurring in the arachnoid space furnishing meningeal symptoms of a labyrinth suppuration, meningitis serosa.

Perforation into the labyrinth is not necessarily characterized by unusual symptoms in the course of a middle-ear affection. In some cases, especially in acute middle-ear suppuration, the sudden onset produces meningeal symptoms.

The temperature is also not affected in these cases, though the sudden onset of a labyrinth suppuration may cause a condition of collapse with subnormal temperature.

In the course of chronic suppurations of the labyrinth there may be transient rises of temperature. All of the labyrinth functions do not need to be affected.

If perforation take place into the vestibule the hearing may be unchanged. In progressive suppuration, and after the vestibule has been opened by operation, in the author's experience complete and pronounced deafness results.

Vertigo occurs in a great variety of degrees. In continued dorsal decubitus, labyrinth disturbances of equilibrium are mild or absent.

In lesions of the horizontal semicircular canal, nystagmus usually occurs on turning the eyes towards the healthy side. On probing a fistula of the semicircular canal, the eyeballs twitch in the form of a horizontal nystagmus without any fixation of the eyes, and persist during the increase of the vertigo. The same symptoms are observed when previously localized disease of the semicircular canal becomes general, or after the radical operation, or on the perforation of an acute otitis into the labyrinth.

Release of cerebro-spinal fluid by lumbar puncture may cause transient vertigo and nystagmus.

In labyrinth suppuration the symptoms of meningitis are sometimes present; paralysis of the muscles and changes in the eye-grounds may have this cause.

In many of the cases the diagnosis can only be made by exclusion, if the labyrinth symptoms do not disappear after operation or do not begin until later. In acute suppurations the sudden onset of these symptoms after exclusion of other complications points to an extension to the labyrinth.

After operation the diagnosis may be facilitated by finding fistulæ which may be followed into the labyrinth. Dehiscences

in the semicircular canal can be distinguished from the fistulæ by their regular form. Discoloration of the semicircular canal does not necessarily denote a suppuration in its interior.

After opening a labyrinth, the presence of a suppuration is recognized more by the presence of granulations than by the presence of pus. The discharge of perilymph is very variable. It may be absent in chronic suppurations.

Labyrinth suppurations may heal spontaneously after the filling out of the cavities with connective tissue and bone.

Labyrinth suppurations are more dangerous when the communications with the middle ear are very narrow. The perilymphatic space of the labyrinth and of the cavity may remain in open communication without a purulent meningitis following the labyrinth suppuration. The meninges show relatively large resistance against infectious agents coming from the labyrinth. They react to infections from labyrinth suppuration not only in the form of purulent meningitis but frequently by mild, curable, and relapsing inflammations.

Labyrinth suppurations in tuberculosis of the middle ear may cause a purulent meningitis if the pus contains a mixed infection. The tuberculous process within the labyrinth may partially or completely heal. A labyrinth tuberculosis causes a meningeal tuberculosis just as rarely as a labyrinth suppuration produces a purulent meningitis.

Operation may produce spontaneous cure of the labyrinth lesion. It is, however, not unusual that the operation causes a labyrinth suppuration to flare up, and causes a manifest and final meningitis. The operation for labyrinth suppurations in the presence of a labyrinth filled with pus may easily make the process much more dangerous than it was before.

The indications for opening a diseased labyrinth require more definite determination in the absence of greater experience.

The treatment at the present stage must consist in converting the labyrinth empyema with a very narrow or no opening into one with a large communication. The opening of the labyrinth should take place when there are no fistulæ in those places where perforation is most apt to occur from the middle ear into the labyrinth. The opening of the semicircular canal alone is not sufficient to drain the entire labyrinth.

If the labyrinth symptoms do not improve after exposure of the vestibule, and if the functional examination has shown

destruction of the cochlea, the cochlea should be opened from the promontory.

In deep extradural abscesses at the posterior petrous surface and in cerebellar tumors of labyrinthine origin, the vestibule can be opened posteriorly—in these cases, in addition to the lesion of the superior petrosal sinus, the jugular bulb may be injured if it is situated unusually high up.

VON STEIN (Moscow). **Diagnosis and treatment of labyrinth suppurations.**

The author comes to the following conclusions:

1. Thorough examination does not always show the presence of a labyrinth suppuration, as we have no absolutely certain method at present to diagnose one-sided lesions, especially in children.

2. In all cases of purulent inflammation of the labyrinth, more or less severe static and dynamic disturbances are present, even though the lesions be only partial or superficial.

3. A distinction should be made between paralabyrinthitis (affection of the bony capsule), and perilabyrinthitis (where pus or an exudate exists in the perilymphatic space), and endolabyrinthitis (an accumulation in the endolymphatic space); finally there is a panlabyrinthitis.

4. In paralabyrinthitis there is no disturbance of equilibrium.

5. The variety of surgical procedure depends upon which form is present, though it is difficult in advance to determine the extent of the lesion. Necrosis of the labyrinth is always manifested by labyrinth symptoms.

6. On removal of necrotic parts of the bony labyrinth, special precautions should be taken on account of the internal carotid, especially in children.

In most of the cases of purulent endolabyrinthitis, the opening of the vestibule is sufficient with careful curettage and insufflation of iodoform and daily dressings.

7. In a perilabyrinthitis the membranous semicircular canals should not be opened if one is not certain that pus is contained within the endolymphatic space.

DUNDAS GRANT. **Practical conclusions from the latest experiences in labyrinth suppurations.**

Jansen and Lucae discovered the relative frequency of labyrinth suppurations. Formerly they were unquestionably frequently overlooked. The mortality of cases not operated upon

has been calculated at about 50 %; this can be reduced to 20 % by operation.

According to Jansen, 62 %, and according to Whitehead 36 %, of labyrinth suppurations succumb to meningitis; according to Heine, fatal otitic meningitis was caused by the labyrinth in 42 % of the cases, according to Whitehead in 27 %. The reviewer, therefore, urges that cases of serous meningitis should be treated by lumbar puncture and opening of the labyrinth, in addition to the radical operation.

Cerebellar abscesses induce, according to Hinsberg, 12.5 %, according to Whitehead 54 %, of all the fatal labyrinth suppurations. According to Okada, 56 % of the cerebellar abscesses, and 71 % according to Whitehead, are produced by caries of the petrous bone, which almost always involves the labyrinth.

All other cerebellar abscesses are produced by sinus phlebitis. Hence, in cerebellar abscess without sinus phlebitis, the labyrinth should be opened and carefully inspected. In order to avoid injuries to the labyrinth, the author recommends burrs or very sharp chisels.

The opening of the labyrinth increases the danger of the operation. The suppuration, according to Jansen, in many cases is limited to the external semicircular canal. The progression of the suppuration from the labyrinth to the meninges is sometimes avoided by inflammatory connective-tissue formation in the internal auditory meatus.

Nerve deafness may be produced by non-purulent inflammation of the labyrinth, and is alone not a sufficient symptom to open the labyrinth.

30. POLITZER (Vienna). Pathological changes of the labyrinth in chronic purulent otitis media.

According to the author, these changes occur very much more frequently than has been imagined. Microscopic specimens were demonstrated.

31. PANSE (Dresden). Demonstration of ten specimens of labyrinth suppuration.

32. MOURE (Bordeaux). Kinematograph demonstration of a patient affected with disease of the labyrinth.

33. ESCAT (Toulouse). Three cases of cochlear necrosis, with spontaneous sequestration.

The two first cases, produced by chronic suppuration, are not of any particular interest. In the third case, there was an acute

labyrinthitis, due to scarlet-fever, without otitis media. The otitis media occurred later, and the cochlea was sequestered in full. The author assumes a septic thrombosis of the cochlear artery, with preservation of the branches going to the vestibule and the semicircular canal.

34. CHAVASSE (Paris). **Otitic extradural abscess "à distance," which perforated spontaneously through the parietal bone. Recovery.**

Discussion on Labyrinth Suppurations.

BOTEY (Barcelona): In case of suppuration, the labyrinth is always to be totally exposed. There are patients with labyrinth symptoms in aural suppurations without purulent labyrinthitis, and the reverse.

NEUMANN (Vienna): If the labyrinth suppuration advances by the preformed way to the interior of the skull, meningitis results. If bone necrosis occurs, a cerebellar abscess is formed. To be certain that lumbar puncture gives a sterile fluid, an anaërobic culture must be made. In that case, frequently pathogenic organisms are found.

VON STEIN (Moscow) recommends his goniometer to determine the more delicate disturbances of the functions of the labyrinth. One should at least make the patients attempt jumping experiments; walking alone is not sufficient.

BRIEGER (in conclusion): The operative treatment of labyrinth suppurations sometimes gives results which can be as little explained as the disappearance of certain cerebral symptoms after the opening of the cranial cavity. The condition at operation may be not at all marked or quite negative, though the opening of the labyrinth is followed by a rapid disappearance of the symptoms. The suppuration always extends first in the perilymphatic space. The extension in the endolymphatic space is secondary. The empyema of the endolymphatic sac is a symptom of diffuse labyrinth suppuration.

Purulent infiltration of the auditory nerves does not necessarily cause purulent meningitis.

Not only anaërobic bacteria may cause meningitis after labyrinth suppuration, but saprophytes, which are indifferent in the middle-ear cavities, may become virulent in the labyrinth and in the arachnoid spaces.

Lumbar puncture should not be neglected in cases of labyrinth

suppuration. It is interesting to note its action upon certain labyrinth symptoms—the occasional improvement of the vertigo and nystagmus—and the demonstration of pus in the spinal fluid in labyrinth suppurations without purulent meningitis.

35. LERMOYEZ and BELLIN (Paris). **On the surgical treatment of acute otitic meningitis.**

Two cases in which exposure of the diseased meninges in combination with lumbar puncture, with the positive presence of bacteria, resulted in recovery. In both cases subsequently large labyrinth sequestra were discharged. The infection consequently took place from the labyrinth.

Discussion.

BRIEGER (Breslau): The symptoms of meningitis are to a great extent associated with increase of cerebro-spinal fluid. Lumbar puncture may, therefore, modify the clinical picture—amelioration of the cerebral symptoms, the rigidity of the neck, the ocular paralyses, etc.—and may even seem to cause a change for the better for a short period. It seems, therefore, proper that therapeutically we should act in this direction by removal of the primary focus and evacuation of the increased and infected cerebro-spinal fluid. Craniotomy, with opening of the arachnoid space, has, under certain conditions, distinct disadvantages. Owing to the marked œdema of the brain tissue, enormous prolapses of the brain may occur, which are not always influenced by lumbar puncture. Incision of the brain in purulent meningitis may produce a brain abscess.

The danger of making a circumscribed meningitis general from lumbar puncture needs hardly to be considered because, first of all, circumscribed meningitis localized to a small area of the arachnoid space is extremely questionable. In otitic meningitis there are cases in which the meninges appear macroscopically over large areas entirely normal where, notwithstanding, an infectious process is present in the arachnoid space.

LERMOYEZ states that in his experience a paralysis of the abducent nerve is not absolute proof for an associated meningitis.

36. MOURET (Montpellier). **On direct communication between the mastoid antrum and the posterior wall of the petrous pyramid.**

This concerns the anatomic condition of the fossa subacuta.

37. LAFITE-DUPONT (Bordeaux). **The pneumatic cells of the middle ear.**

Anatomical investigation.

38. SZENES (Budapest). **Demonstration of pathological specimens.**

1. Alveolar melanosarcoma of the auricle. 2. Epithelioma of the auricle. 3. Osteoma of the external auditory canal.

39. BOTEY (Barcelona). **The prevention of atresia of the canal after the radical operation.**

The author describes his meatoplasty, which consists, after the complete operation, of dividing the meatus in the superior and anterior angle. Directly after this a perforated metal cone is inserted, which remains in from five to six weeks. Gauze is introduced within the cone.

LERMOYEZ (Paris) does not introduce the gauze into the wound but simply insufflates boric acid. The granulations disappear of themselves.

40. BOBONE (San Remo). **The preparation of the patient for operation.**

41. LOMBARD (Paris). **On the pathology of mastoiditis.**

The author draws attention to a group of cells which are situated between the sinus and the facial nerve, which are frequently involved and escape the operator's attention.

42. MOURET (Montpellier). **Sinus thrombosis on the sixth day of an acute purulent otitis media.**

Ligation of the jugular vein. Recovery.

43. CASTEX (Paris). **Hemorrhage from the jugular vein and later paralysis of the facial nerve.**

Injury to the jugular bulb by incautious curettage of the floor of the tympanum during operation. Nine days later facial paralysis, with recovery after two weeks.

44. MAHU (Paris). **On mastoiditis in cases of atresia of the meatus.**

The atresia, whatever its cause, is always a severe complication of otitis media.

Four cases are reported, in all of which the so-called Bezold perforation occurred. The author, therefore, recommends in cases of purulent otitis with atresia of the canal that the antrum should be immediately opened.

45. MASSIER (Nizza). **A case of otitic pyæmia without thrombosis of the lateral sinus.**

Multiple metastases. Recovery.

46. BAR (Nizza). **Perisinuous extradural abscess. Recovery.**

47. CLAOUÉ (Bordeaux). **Two cases of enormous cholesteatoma.**

48. CAUZARD (Paris). **A case of caries of both petrous bones.**

49. BAR (Nizza). **Vesico-pustular affection of the external auditory canal caused by pathogenic micro-organisms.**

50. MIGNON (Nizza). **A severe form of eczema of the auricle.**

A man eighty years of age, with long-standing eczema, made worse by an external otitis, occlusion of the canal, subsequent purulent otitis, mastoiditis, facial paralysis. Operation. Gangrene of the auricle. Sudden death from embolism. No diabetes; no albuminuria.

51. DIDSBUY (Paris). **Acute otitis media in an adult. No spontaneous or artificial perforation. Discharge of pus through the tube. Rapid recovery from the otitis. Complications in the neighboring structures.**

The complications consisted of a maxillary empyema and abscess in the lower turbinal.

52. **Operations and after-treatment of otitic brain abscesses.** By KNAPP (New York), SCHMIEGELOW (Copenhagen), and BOTEY (Barcelona).

KNAPP: The opening of the abscess can be undertaken in two ways:

(a) From the skull by means of the trephine or chisel (methods of the surgeon).

(b) From the ear. Exposure of the middle-ear cavities, removal of tegmen tympani and antri, following the path of the infection (method of the aurist).

The cerebellum is exposed by an incision along the posterior margin of the mastoid process up to the upper turn of the sigmoid sinus. In the presence of focal symptoms the focus must be directly sought for from the skull and the ear may be treated separately.

The evacuation of pus must be complete; the finger may be introduced into the abscess cavity. The walls of the cavity can be well inspected with the aid of Whiting's encephaloscope. If there is a great deal of pus careful irrigation is of

advantage. If the opening gapes, a drainage tube or gauze is not required.

During the after-treatment cerebral hernia requires special attention. It usually results from the formation of a secondary abscess which must be opened. The prolapse then usually disappears slowly and does not need to be excised. Relapses of brain abscesses are apt to occur if the opening be too small.

SCHMIEGELOW: The opening in the skull should be so made as to permit access both to the cerebrum and to the cerebellum, as it is not always possible beforehand to locate the site of the abscess.

The narcosis (ether or chloroform) should be given with extreme caution.

Every otitic abscess should be explored from the fully exposed ear cavities.

For opening, a scalpel is most serviceable; drainage by a rubber drain.

BOTEV advances the same opinions.

He suggests preliminary puncture through the dura, then opening with the scalpel, and does not advocate irrigation. Drainage with rubber tube to be changed daily.

The prognosis of brain abscess is always serious because of the frequent relapses and complications.

53. GRADENIGO (Turin). **Paralysis of the abducent nerve as a symptom of endocranial complications of otitis.**

The author has observed twelve cases. Associated homogeneous paralysis of the abducent nerve is due to a local leptomeningitis which is the result of an infection travelling along preformed paths. The meningitis remains localized and in most cases recovery occurs.

54. TOMMASI (Lucca). **Two cases of otitic cerebral abscess.**

Discussion on the Operation of Brain Abscess.

MACEWEN (Glasgow): In otitic abscess of the brain it is not sufficient to remove the primary focus in the bone and the secondary focus in the brain, but the intermediate path must be eradicated; otherwise secondary abscess will result. Therefore, in the cases in which a delay of twenty-four hours is possible after the mastoid operation and exposure of the dura, Macewen introduces small pieces of gauze soaked in 5% carbolic acid

between the dura and the bone to induce adhesions. Usually these are formed within twenty-four hours, or in certain cases it is proper to wait an additional twenty-four hours. The abscess is then opened. Chloroform is better than ether, as the latter causes brain œdema and symptoms of compression. An extensive incision is made and then careful irrigation with a 2½% carbolic-acid solution. Gauze is better than a rubber drainage tube, though the author does not drain in any case. In the operation for cerebellar tumor the veins are likely to be injured in opening the dura. The author has observed one case of air embolism induced in this manner.

URBAN PRITCHARD (London) and DENCH (New York) advocate drainage with rubber tubes.

BRIEGER (Breslau): Wide opening of the cerebral abscess does not always ensure complete elimination of the infectious organisms. In the causation of brain abscess, just as for meningitis, there are certain micro-organisms which are saprophytic in the middle ear and later become pathogenic after they have reached the brain tissue. Their products may remain toxic even after the evacuation of the abscess.

On the other hand, there is danger of an infection of the arachnoid space, especially if the adhesions be separated. Their action does not necessarily mean a meningeal suppuration. There may be an œdema in the entire arachnoid space (meningitis serosa) which may produce ocular paralysis and optic neuritis after evacuation of the abscess.

In some cases the pus in the abscess is not so infectious as to produce this result. An abscess may, for instance, be in permanent or transient communication with the lateral ventricle by a plug of fibrin, and parts of the purulent contents may circulate in the arachnoid space without producing a purulent meningitis.

As to the remarks of Gradenigo, conditions such as he has described are observed in the course of chronic purulent otitis. In uncomplicated suppurations localized to the middle ear, lesions, especially of the abducent nerve, involving the trunk at the base or the nucleus, may occur with severe headache. Though these are only slowly affected by relief of the pressure, as by the evacuation of an extradural abscess, they are apt to disappear immediately after lumbar puncture if a large quantity of apparently normal spinal fluid is evacuated under pressure.

The continuation of disturbance of equilibrium after the

operation for labyrinth suppurations does not mean that a cerebellar abscess is present. Disturbances of equilibrium are usually rare in abscesses of the cerebellum and are qualitatively different from labyrinth vertigo.

This usually ceases very gradually after an operation—never so rapidly that from its continuation diagnostic deductions are possible.

55. MOURE and BRINDEL (Bordeaux). 500 cases of operation on the mastoid process.

Within the last nine years 269 radical operations and 231 simple operations have been performed upon the mastoid process.

The greatest frequency of radical operations occurred in the second decade; of simple operations, in the third.

42 cholesteatoma, 6 sinus thrombosis, 9 extradural abscesses, 5 brain abscesses, 12 labyrinth suppurations.

In 113 the internal table of the skull was affected, the dura was covered with pus and granulations.

In 38 the sinus was displaced anteriorly, while in 22 it occupied the region of the antrum directly beyond the canal; in 16 it was separated by about 1 cm from the canal.

In 10 cases a group of cells was observed in the petrous pyramid, situated between the sigmoid sinus and the facial canal, extending in the direction of the internal auditory meatus.

142 radical operations were made for chronic otorrhœa; all were healed.

127 were operated on for associated complications; 18 of these died.

Of 231 simple operations, 14 died.

56. POLI (Genoa). On the diagnosis of a presumable case of auricular epilepsy.

A lawyer, thirty-six years of age, neurasthenic, was taken ill in May, 1903, with typical epileptic attacks which occurred each month. In May, 1904, he suffered from a discharge from the right ear without pus. A fistula was found in the upper wall of the canal. Drum intact, good hearing, no labyrinth symptoms, slight tenderness at the upper attachment of the auricle, negative eye-grounds, urine normal, as well as sensibility, motility, and reflexes. Since the onset of the suppuration, which is continuing, the epileptic attacks have ceased.

57. SZENES (Budapest). A case of hysteria due to an acute purulent otitis.

58. BOUYER Fils (Cauterets). **Hysterical otalgia and aural surgery.**

59. MASSIER (Nizza). **Bilateral mastoiditis with brain symptoms during puerperium.**

Recovery without operation.

60. BRUDER (Paris). **Disadvantages in the use of hydrogen peroxide in otology.**

1. Nearly neutral hydrogen peroxide is alone to be used.

2. Before its application several drops of fluid vaseline should be insufflated into the canal to prevent maceration and burning of the epithelium.

3. If this, however, takes place, the use of this peroxide should be given up and dressings with sterile vaseline applied. Notwithstanding, the author finds that hydrogen peroxide is of considerable service.

61. HOFFMANN (Dresden). **Osteoplastic operations for chronic suppuration in the frontal sinus.**

The author describes his method of operating with a flap composed of skin, periosteum, and bone. In order to obtain a permanent communication with the nose a spiral drain of silver is introduced and remains for three months.

62. MAHU (Paris). **Moulages.**

These casts are made by Tramond and represent:

(a) Radical operation of the maxillary antrum after Caldwell-Luc.

(b) Radical operation of the frontal sinus and of the ethmoid labyrinth according to Killian.

63. HOFFMANN (Dresden). **Demonstration of cysts of the superior maxilla.**

64. AUBARET (Bordeaux). **Topographic anatomy of the ethmoid labyrinth.**

65. AUBARET. **Shot wounds and foreign bodies in the antrum of Highmore.**

66. BOBONE (San Remo). **Petroleum in the treatment of ozæna.**

67. ROYET (Lyon). **On the symptomatology of adhesions between the posterior lip of the tube and the pharyngeal wall.**

68. ROURE (Valence). **On the passage of bougies in the tubes in cases of dry middle-ear catarrh.**

Demonstration of a steel bougie and a modified catheter.

69. FARACI (Palermo). **A new ear pump.**

70. KOENIG (Paris). **Modified ear catheter which permits the escape of fluid collected in the middle ear.**

There is a canal along the back of the beak.

71. KOENIG (Paris). **On passing bougies in the tube.**

A modification of the catheter which allows the introduction of the bougie and also the air douche. The bougie is introduced into a small channel which opens into the canal of the catheter. During the simultaneous air douche with the double bag by the patient the introduction of the bougies is very much simplified. A different catheter is required for each side.

72. KOENIG (Paris). **Lucae's pressure probe of paraffin.**

The tip is first introduced into the soft parts. The pressure upon the short process of the hammer is thus less painful.

73. SUAREZ DE MENDOZA (Paris). **Should adenoids be removed with narcosis or not?**

The author is opposed to the use of narcosis in this operation and uses it only in exceptional cases.

74. LAFITE-DUPONT (Bordeaux) **demonstrated an apparatus for the application of chlorid of ethyl.**

REPORT OF THE TRANSACTIONS OF THE NEW YORK OTOLOGICAL SOCIETY.

BY DR. T. PASSMORE BERENS, ACTING SECRETARY.

MEETING OF MAY 23, 1905. DR. DENCH, PRESIDENT, IN THE CHAIR.

Dr. TOEPLITZ presented a patient on whom he had **operated for cholesteatoma and chronic residual post-operative mastoiditis**. The operation was the Schwartz-Stacke, into the wound of which he carried a flap of skin taken from between the auricle and the hair-line, thereby securing a permanent dry opening behind the auricle.

Dr. BERENS questioned the wisdom of the procedure, and thought the same curative result might have been secured by the conventional method.

Dr. SHEPPARD related a case of **repeated exfoliation of epithelium** in the middle-ear antrum cavity of a patient on whom he had performed a Schwartz-Stacke operation.

Dr. MAY reported a case of **facial paralysis following intratympanic curettage** for cholesteatoma. The patient had refused a radical operation. There was no improvement of the conditions after two years of treatment.

Dr. KIPP reported a case of **gangrene of a cerebral hernia**, which he removed from a patient previously operated upon for septic sinus thrombosis. The patient died of meningitis. The pathological report on the specimens presented by the laboratory of the College of Physicians and Surgeons was tuberculosis.

Dr. GRUENING called attention to a case he had previously reported of **cerebral hernia** that was materially aided in its recovery by the use of contractile collodion.

He mentioned a case of prolapse of the brain, in which the prolapsed portion came away as a slough and the wound healed.

A few weeks later, there was a flow of clear fluid from the external auditory canal, but no other symptoms of disease. The case is still under observation.

Dr. MCKERNON related a case which **discharged clear fluid (cerebro-spinal ?) from the external auditory canal.** The external auditory canal was full of a polypoid mass. The temperature, which was 103° F., dropped to normal after lumbar puncture, and the discharge from the ear ceased. He always considered the wisdom of operation in these cases a question. He would not operate unless the temperature remained high. He had seen two similar cases, in one of which operation was disastrous.

Dr. GRUENING had seen the first case mentioned by Dr. McKernon, and thought the mass described by Dr. McKernon as a polypoid mass was in reality a mass of brain tissue covered by skin. He thinks continued lumbar puncture better than operation in most of these cases.

Dr. MCKERNON reiterated his belief that the mass was a polypus.

Dr. GRUENING considered these cases of cerebral hernia with leakage of cerebro-spinal fluid to be fistula of the ventricle.

Dr. MCKERNON has had under observation for seventeen months a case on whom he had **operated for lateral sinus and jugular-vein thrombosis.** Four or five months after the operation, cerebro-spinal fluid appeared in the external auditory canal. There have been two attacks, each accompanied by elevation of temperature. Each attack was relieved by the removal of a polypoid mass through the canal. He does not advocate operation in these cases.

Dr. DENCH stated that he had seen a number of cases of **prolapse of the brain.** They all died. In one case he opened the fourth ventricle. The case lived fourteen days and died of spinal hemorrhage. He considers a true prolapse (encephalocele) is always indicative of intracerebral pressure, due to inflammatory action.

Dr. GRUENING reported a case of **diphtheria occurring in a mastoid wound.** The operation was performed during an attack of faucial diphtheria. The patient recovered.

Dr. MAY reported that he had performed a **double mastoid operation** during active faucial diphtheria, without infection of the wound. The patient recovered.

Dr. PHILLIPS reported a case **presenting symptoms of a lateral sinus thrombosis** after operation for acute mastoiditis. Operation failed to disclose disease of the sinus. The patient recovered.

Dr. MCKERNON thought it was an infection of the sinus, possibly a parietal clot, with which statement Dr. GRUENING agreed, and said that he had seen a number of similar cases.

Dr. GRUENING reported a **death from tuberculosis** of a patient on whom he had operated for mastoiditis. The operation revealed extensive involvement of the zygomatic cells.

Dr. SHEPPARD reported a case of **possible infection of the knee-joint** following a radical mastoid operation. The joint recovered without suppuration.

He also reported **symptoms of inflammation in the shoulder-joint** following operation for septic lateral-sinus thrombosis. Pus did not develop and the patient recovered.

He also reported a case **presenting symptoms of abscess of the liver**, and accompanied by symptoms of infection of a number of joints following operation for acute mastoiditis. No pus developed and the case recovered.

Dr. KIPP said that he had had similar cases, and asked how a diagnosis of rheumatism could be excluded. Dr. Kipp said that he had observed similar conditions following tonsillotomy.

Dr. MCKERNON related a case of **fatal septic endocarditis** following acute purulent otitis media.

REPORT ON THE PROGRESS IN OTOTOLOGY FOR
THE SECOND QUARTER OF 1904.

(Concluded.)

BY PROF. ARTHUR HARTMANN, BERLIN.

c.—DISEASES OF THE ACCESSORY CAVITIES.

199. ONODI. **An anomalous frontal sinus.** *Archiv f. Laryngol.*, vol. xv., No. 33.
200. STRUBELL. **On the relation of the blood-vessels of the antrum of Highmore to the teeth.** *M. f. O.*, 1904, No. 6.
201. GOMPERZ. **On foreign bodies in the antrum of Highmore.** *Archiv f. Laryngol.*, vol. xv., No. 29.
202. BARTHA and ONODI. **Primary carcinoma of the frontal sinus.** *Archiv f. Laryngol.*, vol. xv., No. 13.
203. KIRCHNER. **Endothelioma of the maxillary antrum.** *Archiv f. Laryngol.*, vol. xv., No. 1.
204. CITALLI. **Cylindroma of the sphenoidal sinus.** *Archiv f. Laryngol.*, vol. xv., No. 20.
205. DELSTANCHE. **The treatment of the maxillary sinus in the eighteenth century.** *La presse oto-laryngologique Belge*, 1904, No. 5.
206. BROECKHAERT. **Some remarks on the radical cure of chronic empyema of the frontal sinus.** *Annales de la société de méd. de Gand*, 1904, p. 13.
207. DELIE. **Frontal sinusitis, with anomalous sinus.** *La presse oto-laryngologique Belge*, 1904, No. 6.
208. POLYAK. **A case of multiple latent accessory sinus suppuration, with the formation of bony cysts, exophthalmos, and atrophy of both optic nerves.** *Archiv f. Laryngol.*, vol. xv., No. 28.
209. COAKLEY. **An easy method of entering the sphenoidal sinus for diagnostic purposes.** *The Laryngoscope*, April, 1904.
210. MERTINS. **Empyema of frontal sinus, followed by extradural abscess and abscess of frontal lobe; operation, and death from hypostatic congestion of the lungs.** *Amer. Jour. of the Med. Sciences*, Philadelphia, April, 1904.

211. WHITEHEAD. A case of empyema of the right frontal sinus, of the right sphenoidal sinus, of both antra of Highmore, and of the ethmoidal cells on both sides. *ARCH. OF OPHTHAL.*, May, 1904.

212. FETTEROLF. Reflex cardiac inhibition, resulting from irritation of the peripheral fibres of the trifacial nerve, and occurring in the course of an operation for chronic empyema of the frontal sinus. *Amer. Medicine*, March 19, 1904.

213. DOUGLASS. The question of intranasal operation upon the frontal sinus. *The Laryngoscope*, May, 1904.

214. BAILEY. Empyema of the frontal sinus in a case with supernumerary sinuses on each side. *The Laryngoscope*, May, 1904.

215. LEE. Concerning the sinus frontales in man, with observations upon them in some other mammalian skulls. *Bull. of Johns Hopkins Hospital*, April, 1904.

216. MERTINS. Empyema of the frontal sinus and extradural abscess of the frontal lobe. *Amer. Jour. of Med. Sciences*, April, 1904.

199. Two skulls presented the following anomaly, consisting in a recess of the inferior part of the frontal sinus, which extended backward, and without doubt was connected with the development of the anterior ethmoidal cells and of the frontal sinus.

ALBANUS.

200. In order to study the extension of disease from the alveolar processes to the maxillary antrum, and *vice versa*, the author made injection specimens of the vessels which he examined, and found that the following three structures, viz., the mucous membrane of the maxillary antrum, the periosteum, the spongiosa of the superior maxilla, and the teeth are supplied by a system of blood-vessels, which anastomose among one another in an extremely complicated manner. It will be only possible to determine the relation of nasal to dental empyemata by a careful examination of pathological specimens.

PIFFL.

201. In order to irrigate through the maxillary antrum painlessly, the author cocainizes the area selected by Mikulicz in the lower meatus. In withdrawing the applicator, the pledget of cotton remained in the maxillary antrum. Two weeks later, suddenly, in irrigating, the return flow from the nose was arrested, and by a forcible expiration the pledget of cotton was discharged into the canula.

ALBANUS.

202. A man, thirty-seven years of age, suddenly felt, four months ago, as if he had received a blow on the forehead. He heard a crack, and became unconscious. After this, increasing

headache, diminution of sense of smell, swelling in the left internal angle of the nose. Examination showed a broadened root of the nose, the left frontal region prominent, the left upper eyelid protruded by a tumor as large as a hazel-nut. The left eyeball was forced somewhat outwards. Nasal respiration was not interfered with. The sense of smell on the left side was preserved. On transillumination, both frontal sinuses were dark. Operation. Tumor masses were found under the skin of the dorsum of the nose. On the left nasal bone there was a defect $1\frac{1}{2}$ cm long. The left frontal sinus was filled with the tumor, which had perforated into the other cavity. The posterior frontal sinus wall and part of the ethmoid were destroyed. The lower surface of the frontal lobe in the middle line was easily visible. The tumor was separated from the orbit by periorbital tissue, from the nasal cavity by the nasal mucous membranes. Convalescence uninterrupted, without any brain symptoms. In the second half of the month, relapse; loss of sense of smell on both sides. Disturbance of taste. Microscopic examination of the tumor showed a typical cylindrical epithelioma, which in places was covered by a stratified pavement epithelium. The basement cells were of a solid cystic parakeratotic type.

ALBANUS.

203. The author has examined two cases which had been operated upon by Jansen. 1. Nasal polypi had been removed for six years, then pain in the eyes and forehead, occasional nausea, and vomiting. No glandular involvement. Radical operation on both maxillary antra. Relapse after four weeks, which required another operation. A microscopic examination of the tumor showed tumor cells situated diffusely or in groups in a connective-tissue stroma. It is possible to trace the direct extension from the lymphatic endothelium to the tumor cells. The author regards the cylindrical structures found in the tumor as due to a hyaline degeneration of the blood-vessels, the concretions as a form of colloid degeneration of the surrounding cells. The differential diagnosis with carcinoma and sarcoma is reviewed. 2. Inoperable tumor of the left maxillary antrum and the left nasal bone, which is now extending to the other side displacing the eyeball, causing amaurosis with extension into the ethmoid and into the naso-pharynx. Palliative minor operations were repeatedly performed, thus furnishing particles of tumor. The microscopic condition was similar to Case 1. Notwithstanding

ing the similarity in structure, the first was benign, while the second was malignant.

ALBANUS.

204. A patient fifty years of age suffered from progressive occlusion of the nose. The vision of the right eye was diminished, then lost. Finally severe headache. Right exophthalmos; blindness. Left diminution of vision. Hardness of hearing, especially for high tones. The right nasal cavity shows, posteriorly and above, fungus masses, which are also to be seen post-rhinoscopically and cover the right choana. The sense of smell is lost. Particles of the inoperable tumor on examination showed endothelioma with hyaline degeneration—*i. e.*, cylindroma.

ALBANUS.

205. The author describes the diseases of the maxillary antrum, their symptoms and treatment as practised in the eighteenth century, from a book published by Bordenave in 1758 at Paris.

BRANDT.

206. The author recommends Killian's operation for a radical cure in chronic suppuration of the frontal sinus. There are no case-histories.

OPPIKOFEK.

207. On the left side there was an unusually small frontal sinus, which was situated entirely within the supraorbital arch, while the sinus on the right side was comparatively extensive.

BRANDT.

208. A laborer, twenty-four years of age, suffered from occlusion of the nose, then distension of the external parts of the nose, pressing the hard palate downwards. Four years ago the vision in the right eye diminished. The left eye protruded, the right also became prominent, and finally both eyes became blind. Treatment with potassium iodid without result. On examination a broad, bony distension was visible in both inner angles of the eyes. The eyes are pushed forward and externally. On both sides complete optic atrophy. The cheek and upper lip were thickened. The hard palate was protruding downwards. The septum was deviated towards the right side. On the left a large smooth tumor, in all places adherent to the walls of the nose, leaving a small space just above the floor. Both choanæ were filled with the tumor. No enlarged cervical glands. General condition good. Nasal respiration interfered with, and blindness. In order to extract the tumor more easily, the author inserted a knife to divide it. About 200ccm of pus were evacuated

under high pressure. The bony cyst was removed. According to the author, the suppuration of the bony cyst of the left middle turbinal was the primary disease. This cyst increasing in size gradually closed the openings of the ethmoid and sphenoid cavities. These were then dilated and led to the previous symptoms. Treatment was followed by an improvement in the general condition and free respiration. Optic atrophy of course was not influenced. It is remarkable that the patient had never suffered from pain.

ALBANUS.

209. A thin applicator curved slightly upward for about $\frac{3}{4}$ inch and wound with cotton at the end is passed between the middle turbinate and the septum, the uncurved part $\frac{1}{8}$ inch above and parallel to the lower border of the middle turbinate, until it reaches the anterior surface of the sphenoidal bone. The applicator is gradually withdrawn and pushed forward, until it suddenly passes through an opening into a cavity to a depth of half an inch.

M. TOEPLITZ.

210. The abscess pointed at the glabella. Incision. Five days later severe pain, vomiting, and convulsions. Probe passed readily through wound into cranial cavity. Operation showed area of necrosed bone size of silver dollar covering an extended abscess. Pus in left frontal sinus, right sinus healthy. The dura pulsated only on the left side; no fistula. A hollow needle evacuates pus from the right side. Second operation. Abscess opened and packed. Autopsy found the abscess well encapsulated.

BRYANT.

211. Removal of the anterior wall of the sinus disclosed the backward extension communicating with the anterior ethmoid cells, where the dura mater was exposed. The author deprecates operating which is not thorough, since this case shows the futility of a superficial operation.

BRYANT.

212. During the operation of a chronic empyema of the right frontal sinus of a man, aged thirty-five, a trigemino-cardio-inhibitory reflex occurred. Each time the curette would be applied to the sinus wall, there was a marked diminution in the force, fulness, and frequency of the pulse along with distinct cyanosis. The curetting had therefore to be frequently interrupted. This phenomenon is also noticed in dental operations, and a similar reflex has been proved to occur in operations on the ear involving areas supplied by the fifth nerve.

M. TOEPLITZ.

213. DOUGLASS investigates the anatomical relations of the frontal sinus, in order to ascertain, if it is justifiable to enlarge the opening into the sinus sufficiently to secure thorough drainage and subsequent entrance with instruments. Five reasons show the dangers and difficulties encountered in intranasal operations, the two greatest being the second and the fourth. 1. The frontal sinus may be absent. 2. The posterior wall of the sinus may vary greatly in its height from the naso-frontal duct from 4 to 40mm. 3. An anterior ethmoidal cell may be mistaken for the sinus. 4. The naso-frontal duct is separated from the olfactory fissure by the very thin processus uncinatus. 5. The direction and position of the naso-frontal duct varies considerably. The duct may open quite posteriorly, thus becoming more oblique. The problem of the intranasal operation consists in reaching the floor of the sinus, which lies away from the brain, in a safe way, viz., to remove the anterior edge of the processus uncinatus, the anterior wall of the naso-frontal duct, and that ridge of bone which projects from the anterior wall of the sinus and base of the nasal bone. For the removal of this ridge, cutting instruments must work at an angle forward of about 45° , and externally at an obliqueness of about 5° from the perpendicular.

M. TOEPLITZ.

214. A middle-aged man was suffering from extreme pain over the right eye. The right frontal sinus was opened and drained. No improvement, but meningitic symptoms and death took place. The autopsy revealed the existence of a double frontal sinus on each side; each posterior sinus of the same size as the anterior, opened by separate passages into the middle meatus of the corresponding side. In the right posterior sinus there was caries of the posterior wall, from which the suppuration had extended, causing a diffuse suppurative meningitis.

M. TOEPLITZ.

215. LEE made a series of metallic injections of the sinus frontales, the technique of which is fully described, of twenty-one adult male subjects, in ages ranging from twenty-five to sixty years. The sinus frontales vary in respect to symmetry, not only by deflection of the septum, but also in other characteristics. The pars frontalis is separated in varying degrees from the pars orbitalis by the septum interpartes. The cavities are subdivided by bony trabeculae, called septa lateralia in the pars frontalis, septa dorsalia in the pars orbitalis. The sinus frontalis

may be absent throughout life. The superciliary arch does not furnish precise information concerning the size of the sinus beyond. Out of twenty pairs the right sinus was largest in thirteen, the left in three; the remaining four were about equal. Out of nineteen cases the pars frontalis was largest in thirteen. The septa do not bear any relation to the size. The pars orbitalis existed bilaterally in ten crania. It may consist of one or many chambers. The sinus frontalis of the ox excavates the frontal, parietal, and occipital bones, only the peripheral portions of the very large cavity being divided by thick trabeculae into small pockets. The sinus extends up into the horn, which near its base is also trabeculated, as a protection against traumatism. The frontal sinus of the pig's skull excavates the frontal and a portion of the parietal bone. The sinus frontalis in the sheep is limited to the ventral and lateral portions of the frontal bone, and is subdivided into two portions, like in the pig's skull, by a septum interpartes with much sacculation at the periphery. In the dog the frontal sinus shows an irregularly spherical or ovoid cavity in the frontal bone, divided by a septum and with less sacculation. In the skull of the cat the sinuses are limited to the frontal bone, separated from each other, and divided into partes frontales and orbitales, with a septum interpartes, but without trabeculae. In monkeys there is no sinus frontalis present, notwithstanding the well developed arcus superciliaris. There are a number of dilated bony cells taking the place of the sinus.

M. TOEPLITZ.

216. A boilermaker, æt. forty, had suffered for six months from steadily increasing violent headaches. Within the last three days before Sept. 8, 1903, a fluctuating swelling with harder rim, of the size of a goose-egg, had appeared in the region of the glabella. He had syphilis sixteen years ago and had received a blow from a hammer on the top of the head two years ago, which had made him unconscious for several days. The abscess was incised and an ounce of foul pus was evacuated with relief. On the third day the pain returned, the flow of pus increased, but when the head was held forward the pain decreased. On Sept. 13th the pain grew more severe; vomiting and three convulsions occurred. On the following day the cerebation was slow, but relevant. Necrosed bone was found in the wound on probing, whereby the cranial cavity was entered. On Sept. 14th, by a long incision, necrosed bone, of

the size of a silver dollar, of dark brown color, like the top of a pepper-box, was laid bare; from numerous fistulæ pus oozed at each respiration. It was removed by trephine. An extradural abscess, containing about an ounce of pus, was laid bare and the opening enlarged to the size of a dollar by the rongeur forceps. The dura was adherent all around to the frontal bone. By the removal of necrosed bone, the left frontal sinus containing half an ounce of pus was opened. The right frontal sinus was healthy. The dura was very thick, of dirty yellowish color, and pulsated on the left side only. No fistulæ. The needle found a few drops of pus on the right side only. Sept. 23d: Transient paresis of right internal rectus; right optic neuritis. Sept. 25th: Mental condition more obscured. Another aspiration of the right frontal lobe was made. A cavity was entered $3\frac{1}{4}$ inches deep; pus flowed into the aspirator. By the opening of the blades of scissors, $1\frac{1}{2}$ ounces of creamy pus and a yellowish lump of broken-down brain tissue were evacuated. The cavity was gently curetted. Improvement followed: rise of pulse, abscess cavity growing smaller, discharge and granulations formed over the exposed dura less, appetite good, mind clear. Sept. 30th: Temp. 102° ; hypostatic congestion of inferior lobe of right lung. Oct. 3d: Involvement of left lung. Death. Autopsy: Depressed fracture, $\frac{1}{2}$ inch deep, on left parietal bone with opening at the bottom. Dura here and around the trephine opening adherent to bone and brain. The posterior wall of the sinus was necrosed and a fistulous tract led from the sinus to the extradural abscess. The abscess in the brain was $1\frac{1}{2}$ inches deep and well walled off. The pulmonary hypostasis was the cause of death.

M. TOEPLITZ.

f.—OTHER DISEASES OF THE NOSE.

217. BAUROWICZ. Congenital bilateral closure of the anterior nares. *Archiv f. Laryngol.*, vol. xv., No. 12.

218. BROECKHAERT. Vegetative rhinitis. *La presse oto-laryngologique Belge*, 1904, No. 6.

219. GELLÉ. Nasal hydrorrhœa of traumatic origin. *Arch. internat. d'otol.*, etc., 1904, p. 817.

217. On the day of birth a male child presented an occlusion of the nares. The author saw the patient three months later, a poorly developed child, with a funnel-shaped closure of both openings in a broad and short nose. On both sides there was

a very small fistula in the skin. Operation with the electro-cautery; after-treatment with nasal tubes. The author believes that this anomaly occurred in the first half of the second month and depended upon a disturbance of development.

ALBANUS.

218. A variety of chronic rhinitis is described, in which small flat tumors appear on the mucous membrane of the septum and occasionally on the turbinals. The tumors show the histological structure of simple granulation tissue without any tuberculous characteristics. They are to be regarded as inflammatory hyperplasias of bacterial origin.

BRANDT.

219. In an attempt to commit suicide, the bullet passed between the hard and soft palates and perforated the lamina cribrosa of the left ethmoid, as was shown by an X-ray picture. The patient recovered, though for forty-one days a great deal of cerebro-spinal fluid escaped from the nose. Then the discharge ceased and complete recovery took place.

OPPIKOEFER.

g.—NASO-PHARYNX.

220. FINDER. A peculiar form of adenoid vegetation. *Archiv f. Laryngol.*, vol. xv., No. 34.

221. LUBINSKY. Some remarks on adenoid vegetations. *Berl. klin. Woch.*, 1904, No. 28.

222. URBANTSCHITSCH. Some precautions in operations for adenoid vegetations. *M. f. O.*, 1904, No. 24.

223. ROSENSTEIN. Modification of Beckmann's curette. *Münchn. med. Woch.*, 1904, No. 1.

224. MANHENKE. A case of pyæmia after operation for naso-pharyngeal polypus. *Münchn. med. Woch.*, 1904, No. 7.

225. STENGER. Malignant tumor of the naso-pharynx. Purulent mastoiditis. *A. f. O.*, vol. lxi., p. 247.

220. A pharyngeal hyperplasia, as large as a dove's egg, was removed from a child, eight years of age, which apparently did not differ in any way from an ordinary pharyngeal vegetation. The tumor hung down into the naso-pharynx, and could be seen on lifting the soft palate as a thick growth with nodular surface. Microscopically it showed lymphatic tissue in a papillomatous structure which, according to the author, was produced by irritations caused by pressure from the soft palate.

ALBANUS.

221. The author describes the relation of adenoid vegetations to scrofula, to diseases of the eyes, diseases of the respiratory passages, disturbances of digestion, constitutional diseases, tuber-

culosis, aprosexia, and other diseases. The operation should be undertaken, even for moderate hyperplasias, as soon as they produce any symptoms whatever. MÜLLER.

222. The protection consists in a little bag which is attached to a ring-shaped pharyngeal tonsillotome, which catches the tonsil after it has been excised. PIFFL.

223. The handle of the instrument is curved in a concave direction to the point where it lies on the lower jaw.

A similar instrument has been used in the Munich ear clinic for years. SCHEIBE.

224. One day, after a secondary operation for naso-pharyngeal fibroma with a cold snare, pyæmia occurred, which ended fatally. No packing was introduced. In literature there is only the account of one similar case of pyæmia. At autopsy, the naso-pharynx showed no signs of inflammation.

According to the author, the cause for this unfortunate incident lay in a septic thrombus which was loosened at the time of the after-operation, and thus immediately attained the general circulation. SCHEIBE.

225. A probable sarcoma of the base of the skull, possibly arising from the sphenoid bone. At first the tumor gave only the symptoms of a catarrh of the Eustachian tube, with subjective noises and deafness. These symptoms continued, with severe headache. The vision diminished; there were muscular paralysis of the eye, purulent mastoiditis, exophthalmos, finally paralysis of the extremities. Death. No autopsy. With the onset of the mastoid suppuration, an extradural or brain abscess was surmised, and an operation undertaken. Later on, by the appearance of the tumor in the nasal cavities and in the naso-pharynx, the nature of the process was made clear. HAENEL.

h.—PHARYNX AND MOUTH.

226. KATZ. Tuberculosis of the soft palate. *M. f. O.*, 1904, No. 4.

227. HERZFELD. The treatment of granular and lateral pharyngitis. *M. f. O.*, 1904, No. 5.

228. BEZDĚK. A case of pendulous tonsil. *Wiener klin. Wochenschr.*, No. 18, 1904.

229. FINDER. An additional case of lipoma of the palatal tonsil. *Archiv f. Laryngol.*, vol. xv., No. 11.

230. SENDZIAK. Primary carcinoma of the laryngeal tonsil. *M. f. O.*, 1904, No. 6.

231. HARLAND. A case of hemorrhage following tonsillotomy. *The Laryngoscope*, May, 1904.
232. WRIGHT. Autoclasis of the tonsils, an auxiliary process of their retrogression. *The Laryngoscope*, April, 1904.
233. BLACKBURN. Sore throats which present symptoms and physical signs of diphtheria. *Amer. Medicine*, May 14, 1904.
234. SPRATT. An improved snare for the removal of the faucial tonsil. *Amer. Medicine*, Jan. 30, 1904.
235. BROWN. A case of exfoliation of the anterior arch of the atlas. *Jour. Amer. Med. Assoc.*, March 12, 1904.
236. DAVIS. A case of angina Ludovici. *Amer. Jour. Med. Science*, Feb., 1904.
237. JARECKY. Hemorrhage after tonsillotomy; its general consideration. *Med. Record*, April 30, 1904.
238. RUPP. Pipe-smokers' ulcers of the hard palate. *The Laryngoscope*, March, 1904.
239. RENNER. Tertiary syphilis of the nose and pharynx. *N. Y. Med. Jour. and Phila. Med. Jour.*, Feb. 27 to March 19, 1904.
240. OHLS. A pharyngo-laryngeal tumor. *The Laryngoscope*, Jan., 1904.
241. SMITH. Alarming hemorrhage following tonsillotomy. *The Laryngoscope*, Feb., 1904.

226. A report of two cases of tuberculosis of the soft palate, of which the first, occurring with simultaneous pulmonary tuberculosis in the last stages of phthisis, is not very unusual, while the second showed the unusual condition of a perforation of the soft palate, and is also striking because, with the aid of cauterization, curetting, and the application of 80 % lactic acid, a relatively favorable result was obtained. PIFFL.

227. The author describes a method of removing the lateral edges and the granula on the posterior pharyngeal wall, which he had described ten years ago. He objects to the angular scissors, and prefers a curette-like instrument with straight branches. PIFFL.

228. A girl, sixteen years of age, suffered for three years from pain in the neck, dysphagia, and the sensation of a foreign body in the throat. The tumor was removed with a galvano-cautery snare. Histologically it proved to consist of atrophic-tonsil tissue. WANNER.

229. A woman, forty-three years of age, presented, directly behind the right palatal tonsil, a tumor as large as the terminal phalanx of the little finger. This was removed with a tonsillotome. Examination revealed fatty tissue, connective tissue, and

lymphatic tissue. Examination with a probe showed the origin of the tumor not to be the tonsil, but the supratonsillar fossa.

ALBANUS.

230. A man, sixty-two years of age, who had had lues, suffered from an ulcerating tumor at the base of the tongue, which was not examined microscopically, and consequently cannot be regarded as a carcinoma of the lingual tonsil, as the author suggests. The reviewer observed, four years ago, a similar tumor in an old man, which examination proved to be a glandular carcinoma. The development from the tissue of the lingual tonsil could, therefore, not be confirmed.

PIFFL.

231. In a girl, aged fourteen years, removal of the left large fibrous tonsil was attempted with a Matthieu tonsillotome, the blades of which cut only partly through. HARLAND severed it completely with a pair of scissors. The right tonsil was then readily removed. Profuse bleeding began immediately, and was stopped by pressure with the thumb upon the upper part of the left tonsil. After removal of the thumb, the bleeding started again; after two hours of pressure, the Paquelin cautery completely seared the upper part of the tonsil. No recurrence took place.

M. TOEPLITZ.

232. Many cases reported as papilloma of the tonsil and as so-called supernumerary tonsil are the manifestations of a stage of tonsillar retrogression. The growths of the tonsil, appearing as papillomata, are, according to WRIGHT, exceptional examples of an auxiliary process called autoclasis. The papillary excrescences on the walls of dilated lacunæ are the result of a degenerative rather than of a proliferative process. The narrow bridges of tissue consist only of brittle epithelium. The lymph channels are closing, the fibrous tissue is slowly disappearing, because of lack of nourishment. The keratosis and fibrosis disappear when the lymph channels begin to collapse.

M. TOEPLITZ.

233. BLACKBURN has seen three cases, two of true diphtheria, one of staphylococcic infection. In one case, a woman, the culture showed a pure growth of streptococci. The membrane disappeared on the fourth day, but the temperature remained intermittent between 96.2° and 105.2° F., and a series of chills and sweats, irregular, ten in all, occurred. Numerous abscesses appeared in both tonsils. The kidneys were also affected.

M. TOEPLITZ.

234. For the removal of the faucial tonsils in the adult, SPRATT recommends a snare ending in a ring with an oval fenestrum. The wire loop rests in a groove in the ring and is not exposed until the slide on the handle is pulled. A screw wheel brings sufficient tension on the wire to cut through very fibrous tonsils.

M. TOEPLITZ.

235. A man, thirty years old, carried his head and shoulders rigidly immovable, complaining of severe pain in the throat and muscles of the neck. An angry ulcer, oval, 1 cm long, appeared on the posterior wall of the pharynx a little above the level of the soft palate with profuse purulent discharge and intense inflammation around it. The ulcer began four months after the primary chancre. He slept six weeks in a chair. After energetic antisyphilitic treatment, a year after the first lesion, nearly the entire anterior arch of the atlas separated itself, and a few days later a small piece of bone, shaped like a finger nail, the articular facet from the anterior face of the pin of the axis, was hawked up. The ulcer then quickly healed. The motion of rotation was limited to about one half, but it increased somewhat during later years. Only five cases of syphilitic exfoliation of parts of the atlas or axis have been reported. All recovered, while some eighty cases of caries and necrosis of these bones due to tuberculosis ended fatally with a few exceptions.

M. TOEPLITZ.

236. A male, aged twenty, had a bad tooth in the right lower jaw for some time. A week previous to the first visit, the neck began to swell and later rapidly increased, the jaws being unable to part more than a centimetre; the tongue was thick. The swelling of the neck extended from the zygoma to the clavicle and sternum, and from the edge of the M. trapezius to the median line. Stertorous breathing, dysphagia, talk in whisper. Upon incision in line of the anterior edge of the M. sternocleido-mastoideus, only a few drops of pus escaped. Two rubber drainage tubes were passed parallel to the jaw. A culture showed virulent streptococci. More discharge on the second day and entire relief on the fifth day after operation.

M. TOEPLITZ.

237. The number of post-operative hemorrhages reported up to date is 175, among which were two authentic fatal cases. JARECKY observed a severe hemorrhage in a young man, aged

twenty-one, whose tonsils had been removed under anæsthesia, which was controlled after nine hours with the Mikulicz-Stoerk tonsil hemostat. The hemophilia was not conceded until after the operation. Hemorrhages occur also after other causes and all methods of operation.

M. TOEPLITZ.

238. RUPP observed two cases of ulcer of the hard palate due to pipe-smoking, one in a clergyman, æt. fifty, irregular, elliptical, opposite the second molar tooth, $\frac{1}{2}$ " long, a little less wide to the right of the middle line of the right half of the hard palate. The floor of the ulcer was clean, grayish-white of fibrous consistency; the edges red and vascular, readily bleeding. The surrounding mucous membrane was œdematous, smoky. The ulcer was produced by a briarwood pipe. The other ulcer occurred in a mason, æt. fifty-three, smoking a stub of a clay pipe all day long. The ulcer was opposite the right canine tooth, of half the size of the first, circular. Discontinuation of smoking and hygienic and local treatment healed the ulcer.

M. TOEPLITZ.

239. RENNER gives a full and elaborate account of tertiary syphilis of the nose and pharynx, which also contains some observations of his own: Case 1, lupus syphiliticus. Flat, glistening scar of the right upper lip, extending into the nose to perforation of cartilaginous portion of septum. Tip indurated, small portion of right ala destroyed with the induration around. Cases 2 to 6 were infiltrations of the nasal mucous membrane resembling hypertrophic rhinitis, or where the infiltration was partly broken down with superficial ulceration. In several cases operations were performed without avail, and the diagnosis of syphilis was not made until other lesions appeared. Anti-syphilitic treatment then effected a cure.

M. TOEPLITZ.

240. A man, æt. twenty-nine and a half, had, at the age of four, a growth on the left side of the neck, leaving after removal a large mass of scar tissue adherent to the fascia and interfering with the rotation of the head. Until the eighth year he was subject to severe attacks of croup. In 1888 the uvula and left tonsil were removed. Previous to that he had difficulty in swallowing, which gradually increased even later. Dyspnœa occurred but once, after a run. Several tubercular glands were removed and the subcutaneous adhesions loosened; a hernia of cirrhotic lung tissue was discovered in the field of operation. He threw the

head back when swallowing. His weight was 185 pounds, the height 5' 3"; the neck was short and thick. On Easter night he was found on hands and knees in bed, struggling for breath, and was cyanotic. Digital examination revealed a large movable mass resting on the opening of the larynx. He became unconscious. A rapid tracheotomy was performed. The blood shot from the mouth several feet. Death took place. The tumor extended into the naso-pharynx attached by a narrow pedicle to the inter-arytenoid fold or posterior œsophageal surface of the cricoid cartilage. It had the shape of a flattened pear and measured $2\frac{1}{2}$ ", $1\frac{1}{2}$ ", $\frac{1}{2}$ ", and was easily removed post-mortem with long curved scissors. Microscopically it was found to be a fibroma. A case reported by Lack in 1901 is the only similar observation on record.

M. TOEPLITZ.

241. The causes of tonsillar hemorrhages are: hemophilia, fibroid tonsils, age, sex, acute inflammation, anæmia, malignancy, abnormal vascularization (abnormal ascending pharyngeal art., large tonsillaris, abnormal internal carotid, large vessels in anterior pillar and fauces, large venous plexus, and arteriosclerosis). The exciting causes are: traumatism, local anæsthesia with cocaine and adrenalin. The measures to minimize the danger are: galvano-cautery, paquelin, gauze soaked in tannic acid, ligature, gelatin, ligation of the carotid, styptics, and finally, the most efficient, the hemostat of Mikulicz-Stoerk. SMITH has modified the set-screw of the latter by making it work on a ball-and-socket joint. He used the instrument successfully in three cases, all adults with fibroid tonsils. A tabulated report of fifty-four cases, out of which six have resulted fatally, is appended.

M. TOEPLITZ.